SOIL SURVEY OF

Monterey County, California

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with the
U.S. Forest Service and
University of California Agricultural Experiment Station

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in the period 1965–71. Soil names and descriptions were approved in 1972. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1971. This survey was made by the Soil Conservation Service, in cooperation with the U.S. Department of Agriculture, Forest Service, and the University of California Agricultural Experiment Station and with financial assistance from the U.S. Department of Defense, Department of the Army and Department of the Navy; the U.S. Department of the Interior, Bureau of Land Management; the State of California; Monterey County; and the Gloria, Mission-Soledad, Monterey Coast and Nacitone Resource Conservation Districts.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY contains information that can be applied in managing farms, ranches, woodlands, and wildlife areas; in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for farming, industry, and recreation.

Locating Soils

All the soils of Monterey County, California, are shown on the detailed map at the back of this publication. This map consists of many sheets made from aerial photographs. Each sheet is numbered to correspond with a number on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbols. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information. This guide lists all the soils of the county in alphabetic order by map symbol and gives the capability classification and storie index of each. It also shows the page where each soil is described and the page for the range site in which the soil has been placed.

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and the information in the text. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions and from the discussions of the range sites, capability units, and Storie Index ratings.

Foresters and others can refer to the section "Woodland."

Wildlife managers and others can find information about soils and wildlife in the section "Wildlife."

Ranchers and others can find, under "Range," groupings of the soils according to their suitability for range, and also the names of many of the plants that grow on each range site.

Community planners and others can read about soil properties that affect the choice of sites for recreation areas in the section "Recreation."

Engineers and builders can find, under "Engineering," tables that contain test data, estimates of soil properties, and information about soil features that affect engineering practices.

Scientists and others can read about the soils in "Formation, Morphology, and Classification of Soils."

Newcomers in the area may be interested in the information about the county given in "Environmental Factors Affecting Soil Use."

Cover: Lion Peak is in the center. Henneke soils are on serpentine rock covered by brush and scattered digger pine. Climara and Montara soils are in most of the grassy areas.

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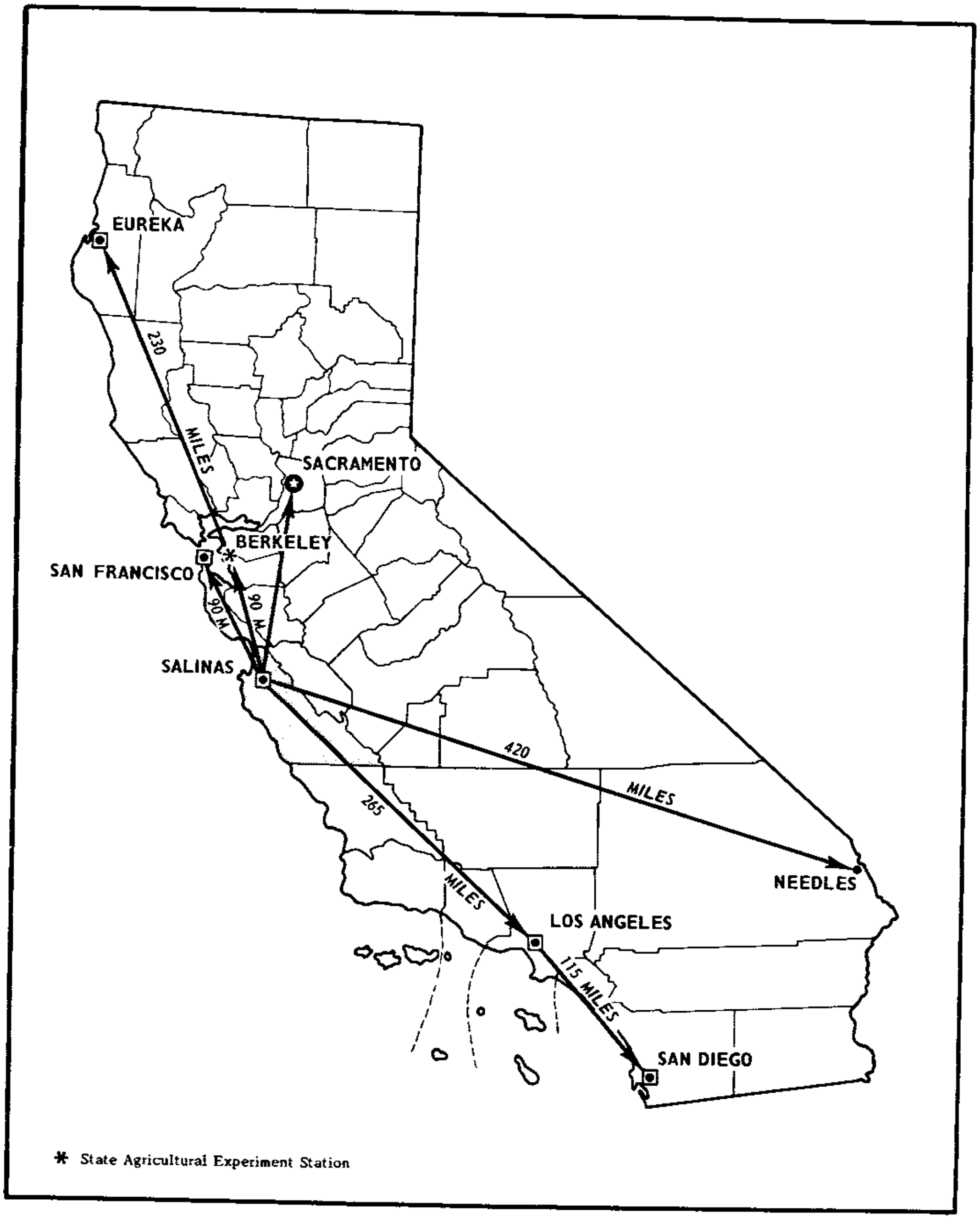

Monterey County, California

SOIL SURVEY OF MONTEREY COUNTY, CALIFORNIA

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UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH THE FOREST SERVICE, USDA, AND THE UNIVERSITY OF CALIFORNIA AGRICULTURAL EXPERIMENT STATION

MONTEREY COUNTY is located along the central coast of California. It is bordered on the north by Santa Cruz County, on the east by San Benito, Fresno, and Kings Counties, on the south by San Luis Obispo County, and on the west by the Pacific Ocean. Monterey County contains 2,127,360 acres, or about 3,324 square miles. It is 130 miles long and approximately 30 miles wide and is divided by the narrow, elongated Salinas Valley, which is approximately 10 miles wide. The Salinas River bisects the county, running northwest from San Luis Obispo County through Monterey County into Monterey Bay. It is 155 miles long and is the largest submerged river in America. The principal tributaries are the Arroyo Seco, Nacimiento, and San Antonio Rivers.

The Santa Lucia Range provides 80 miles of scenic and rugged coastline on the western border of the county. It rises abruptly from the Pacific Ocean to Junipero Peak, which at 5,844 feet is the highest in the county. The Gabilan and Diablo Ranges, on the eastern border of the county, are mostly rolling hills that have grass and brush vegetation.

The climate of Monterey County ranges from cool and moist along the coast, where fog is common, to hot and dry in the south. Near the coast, the average temperature is 57° F, and freezing temperatures are rare. In the southern part of the county, greater extremes in temperature and higher average temperatures prevail. Occasionally snow falls on the crest of the mountains. Precipitation ranges from about 105 inches along the crest of the Santa Lucia Range to 12 inches in the Salinas Valley. The average growing season in the Valley is 240 days.

Near the close of the eighteenth century, the Spanish established a number of missions, presidios, and pueblos in the county. The Presidio (Fort) of Monterey and the Mission San Carlos de Borromeo were established in June 1770. Some small areas near these establishments were farmed until after the close of the Mexican War when the territory was acquired by the United States. Today, Monterey County has a gross farm income of more than $275,000,000 from 46 commercial crops. It has 180,000 acres under intensive cultivation and irrigation and has 24 crops which produce over $1 million each. In farm income produced, Monterey County ranks eleventh in the United States and sixth in California.

Recreation and tourism are increasing as the Monterey Peninsula becomes more well known. Seven and one-half million visitors spent more than $132 million in the county in 1972. This soil survey has been prepared to provide the detailed information required by users of this rapidly developing and expanding farm, urban, and recreational land.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in the survey area, where they are located, and how they can be used. The soil scientists went into the area knowing they likely would find many soils they already knew something about and perhaps identify some they had never seen before. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; the kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has been changed very little by leaching or by the action of plant roots.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in areas nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The *soil series* and the *soil phase* are the categories of soil classification most used in a local survey.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series commonly is named for a town or geographic feature near the place where a soil of that series was first observed and mapped. Arroyo Seco and Sur, for example, are names of two soil series. All the soils in the United States having the same series name are essentially alike in their characteristics.

Soils of one series can differ in texture of the surface layer and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Arroyo Seco gravelly loam,

0 to 2 percent slopes, is one of several phases within the Arroyo Seco series.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map in the back of this publication was prepared from the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a named soil phase. Some mapping units are made up of soils of different series, or of different phases within one series, and some have little or no soil.

While a soil survey is in progress, samples of soils are taken as needed for laboratory measurements and for engineering tests. After the soils are field tested, the interpreted suitabilities and limitations are modified as necessary during the course of the survey, and new interpretations are added to meet local needs. This is done mainly through field observations of behavior of different kinds of soil for different uses under different levels of management. Data are also assembled from other sources, such as test results, records, field experience, and other information available from state and local specialists. For example, data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so it can be readily useful to different groups, such as farmers, managers of rangeland and woodland, engineers, planners, developers and builders, homebuyers, and those seeking recreation.

Soil Maps for Detailed Planning

The kinds of soil (mapping units) shown on the detailed soil maps at the back of this publication are described in this section. These descriptions, together with the soil maps, can be useful in determining the potential of soil, in managing the soil for food and fiber production, in planning land use and developing soil resources, and in enhancing, protecting, and preserving the environment. More detailed information for each soil is given in the section "Use and Management of the Soils."

Preceding the name of each mapping unit is the symbol that identifies the unit on the detailed soil map. Each mapping unit description includes general facts about the soil and a brief description of the soil profile. The potential of the soil for various major land uses is estimated, the principal hazards and limitations are indicated, and the management concerns and practices for the major uses are discussed.

A mapping unit consists of the dominant soil or soils for which the unit is named. Most mapping units have one dominant soil, but some have two or more. A mapping unit commonly includes small, scattered areas of other soils. The properties of some included soils can differ substantially from those of the dominant soil or soils and thus greatly influence the use of the dominant soil. The effect of the included soils on the use and management of the mapping unit is discussed.

In most areas surveyed there are areas that have little or no identifiable soil and support no vegetation. These areas, called miscellaneous land types, are delineated on the map and given descriptive names. Badland is an example. Areas too small to be delineated are identified by a special symbol on the soil maps.

The acreage and proportionate extent of each mapping unit are given in table 1, and additional information on each unit is given in interpretive tables in other sections (see "Summary of Tables"). Many of the terms used in describing soils can be found in the Glossary, and more detailed information about the terminology and methods of soil mapping can be obtained from the Soil Survey Manual (*27*).[1]

Alo Series

The Alo series consists of well drained soils that formed on uplands in material weathered from sandstone and shale. Slopes are 2 to 50 percent. The vegetation is mostly annual grasses and scattered oaks. The elevation is 800 to 3,250 feet. The mean annual precipitation is 15 to 25 inches, the mean annual air temperature is 59° to 62° F, and the frost-free season is 200 to 250 days. Summers are dry and hot, and winters are moist and cool.

In a representative profile the surface layer is dark grayish brown, mildly alkaline silty clay 30 inches thick. Below this is light olive brown, calcareous silty clay 6 inches thick that is underlain by weathered soft shale at a depth of 36 inches.

Permeability is slow, and the available water capacity is 5 to 7 inches. Roots penetrate to a depth of 30 to 40 inches.

Alo soils are used mostly for range, but some areas are used for dry-farmed grain.

Representative profile of Alo silty clay, 30 to 50 percent slopes, about 2.25 miles north of State Highway 25, 1.5 miles SSW of Cleveland Rock; about 100 feet west of road in NW¼NW¼ sec. 36 (projected), T. 19 S., R. 10 E.

A11—0 to 14 inches; dark grayish brown (10YR 4/2) silty clay, very dark grayish brown (10YR 3/2) when moist; strong coarse and medium subangular blocky structure; very hard, firm, sticky and very plastic; many very fine interstitial and tubular pores; common slickensides; mildly alkaline; gradual wavy boundary.

A12—14 to 30 inches; dark grayish brown (10YR 4/2) silty clay, very dark grayish brown (10YR 3/2) when moist; moderate coarse prismatic structure; very hard, very firm, very sticky and very plastic; common very fine roots mostly along faces of peds; many very fine tubular pores; many intersecting

[1] Italic numbers in parentheses refer to Literature Cited, p. 226.

TABLE 1.—*Approximate acreage and proportionate extent of the soils*

Map symbol	Soil name	Acres	Percent
AaC	Alo silty clay, 2 to 9 percent slopes	770	(1)
AaD	Alo silty clay, 9 to 15 percent slopes	750	(1)
AaE	Alo silty clay, 15 to 30 percent slopes	5,605	0.3
AaF	Alo silty clay, 30 to 50 percent slopes	10,165	.5
Ab	Alo-Millsholm complex	13,000	.6
Ac	Alviso silty clay loam	2,350	.1
Ad	Alviso silty clay loam, drained	1,685	.1
AeA	Antioch very fine sandy loam, 0 to 2 percent slopes	6,110	.3
AeC	Antioch very fine sandy loam, 2 to 9 percent slopes	2,170	.1
AeD	Antioch very fine sandy loam, 9 to 15 percent slopes	460	(1)
Af	Aquic Xerofluvents	1,095	.1
AgC	Arbuckle gravelly loam, 2 to 9 percent slopes	3,110	.1
AgD	Arbuckle gravelly loam, 9 to 15 percent slopes	600	(1)
AkD	Arnold loamy sand, 9 to 15 percent slopes	5,030	.2
AkF	Arnold loamy sand, 15 to 50 percent slopes	23,650	1.1
Am	Arnold-San Andreas complex	4,145	.2
Ar	Arnold-Santa Ynez complex	11,400	.5
AsA	Arroyo Seco gravelly sandy loam, 0 to 2 percent slopes	6,685	.3
AsB	Arroyo Seco gravelly sandy loam, 2 to 5 percent slopes	5,305	.2
AsC	Arroyo Seco gravelly sandy loam, 5 to 9 percent slopes	4,820	.2
AvA	Arroyo Seco gravelly loam, 0 to 2 percent slopes	2,915	.1
AvB	Arroyo Seco gravelly loam, 2 to 5 percent slopes	2,315	.1
AyD	Ayar silty clay, 5 to 15 percent slopes	1,495	.1
AyE	Ayar silty clay, 15 to 30 percent slopes	2,040	.1
AyF	Ayar silty clay, 30 to 50 percent slopes	790	(1)
Ba	Badland	25,000	1.2
BbC	Baywood sand, 2 to 15 percent slopes	11,300	.5
CaD	Chamise shaly loam, 9 to 15 percent slopes	4,845	.2
CaE	Chamise shaly loam, 15 to 30 percent slopes	9,360	.4
CaF	Chamise shaly loam, 30 to 50 percent slopes	8,760	.4
CbA	Chualar loam, 0 to 2 percent slopes	22,610	1.1
CbB	Chualar loam, 2 to 5 percent slopes	12,695	.6
CbC	Chualar loam, 5 to 9 percent slopes	8,990	.4
CcG	Cieneba fine gravelly sandy loam, 30 to 75 percent slopes	71,200	3.3
Cd	Cieneba-Rock outcrop complex	55,500	2.6
Ce	Cieneba-Sur-Rock outcrop complex	42,720	2.0
Cf	Clear Lake clay	1,810	.1
Cg	Clear Lake clay, moderately wet	8,170	.4
ChE	Climara clay, 15 to 30 percent slopes	3,260	.2
ChF	Climara clay, 30 to 50 percent slopes	9,450	.4
Ck	Climara-Montara complex	23,700	1.1
Cm	Coastal beaches	1,310	.1
CnA	Cropley silty clay, 0 to 2 percent slopes	16,100	0.8
CnC	Cropley silty clay, 2 to 9 percent slopes	6,160	.3
DaA	Danville sandy clay loam, 0 to 2 percent slopes	5,985	.3
DaC	Danville sandy clay loam, 2 to 9 percent slopes	2,040	.1
DbD	Diablo clay, 9 to 15 percent slopes	3,350	.2
DbE	Diablo clay, 15 to 30 percent slopes	3,960	.2
DbF	Diablo clay, 30 to 50 percent slopes	2,610	.1
DcC	Dibble loam, 2 to 9 percent slopes	1,210	.1
DdB	Dibble silt loam, 9 to 15 percent slopes	785	(1)
DdE	Dibble silt loam, 15 to 30 percent slopes	930	(1)
DdF	Dibble silt loam, 30 to 50 percent slopes	2,800	.1
DeA	Docas silty clay loam, 0 to 2 percent slopes	2,805	.1
DeC	Docas silty clay loam, 2 to 9 percent slopes	8,125	.4
Df	Dune land	3,095	.1
EaA	Elder sandy loam, 0 to 2 percent slopes	6,665	.3
EbC	Elder very fine sandy loam, 2 to 9 percent slopes	1,130	.1
EcA	Elder loam, gravelly substratum, 0 to 2 percent slopes	3,335	.2
EdB	Elkhorn fine sandy loam, 2 to 5 percent slopes	2,100	.1
EdC	Elkhorn fine sandy loam, 5 to 9 percent slopes	1,660	.1
EdD	Elkhorn fine sandy loam, 9 to 15 percent slopes	740	(1)
EeD	Elkhorn fine sandy loam, thin surface variant, 5 to 15 percent slopes	1,435	.1
EeE	Elkhorn fine sandy loam, thin surface variant, 15 to 30 percent slopes	2,185	.1
Fa	Fluvents, stony	5,115	.2
Ga	Gamboa-Sur complex	15,900	.7
GbC	Garey sandy loam, 2 to 9 percent slopes	3,845	.2
GbE	Garey sandy loam, 9 to 30 percent slopes	6,085	.3
GbF2	Garey sandy loam, 30 to 50 percent slopes, eroded	875	(1)
Gc	Garey-Oceano complex	750	(1)
GdE	Gaviota sandy loam, 15 to 30 percent slopes	1,210	.1
GdF	Gaviota sandy loam, 30 to 75 percent slopes	13,300	.6
GeE	Gaviota-San Andreas complex, 15 to 30 percent slopes	9,250	.4
GeG	Gaviota-San Andreas complex, 30 to 75 percent slopes	13,550	.6
GfE	Gazos silt loam, 15 to 30 percent slopes	3,880	.2
GfF	Gazos silt loam, 30 to 50 percent slopes	10,500	.5
GgE	Gilroy gravelly loam, 15 to 50 percent slopes	4,975	.2
GgG2	Gilroy gravelly loam, 30 to 75 percent slopes, eroded	2,685	.1
GhC	Gloria sandy loam, 2 to 9 percent slopes	3,710	.2
GhD	Gloria sandy loam, 9 to 15 percent slopes	2,925	.1

TABLE 1.—*Approximate acreage and proportionate extent of the soils*—Continued

Map symbol	Soil name	Acres	Percent
GhF	Gloria sandy loam, 15 to 50 percent slopes	3,900	.2
GkB	Gorgonio sandy loam, 0 to 5 percent slopes	6,300	.3
GmB	Greenfield fine sandy loam, 2 to 5 percent slopes	1,620	.1
GmC	Greenfield fine sandy loam, 5 to 9 percent slopes	1,250	.1
GmD	Greenfield fine sandy loam, 9 to 15 percent slopes	740	(1)
HaE	Haire loam, 15 to 30 percent slopes	1,570	.1
HbB	Hanford gravelly sandy loam, 0 to 5 percent slopes	1,955	.1
HcF	Henneke extremely stony clay loam, 15 to 75 percent slopes	7,375	.3
JaF	Junipero loamy sand, 30 to 50 percent slopes	1,785	.1
JbG	Junipero sandy loam, 30 to 75 percent slopes	23,810	1.1
Jc	Junipero-Sur complex	19,910	.9
LaD	Linne silty clay loam, 5 to 15 percent slopes	3,300	.2
LaE	Linne silty clay loam, 15 to 30 percent slopes	7,800	.4
LaF	Linne silty clay loam, 30 to 50 percent slopes	5,675	.3
LbD	Linne-Diablo complex, 9 to 15 percent slopes	2,875	.1
LbE	Linne-Diablo complex, 15 to 30 percent slopes	6,025	.3
LcE	Linne-Shedd silty clay loams, 15 to 30 percent slopes	13,030	.6
LcF	Linne-Shedd silty clay loams, 30 to 50 percent slopes	9,055	.4
LcF2	Linne-Shedd silty clay loams, 15 to 50 percent slopes, eroded	15,110	.7
LcG2	Linne-Shedd silty clay loams, 50 to 75 percent slopes, eroded	15,700	.7
LdA	Lockwood loam, 0 to 2 percent slopes	2,130	.1
LdC	Lockwood loam, 2 to 9 percent slopes	3,340	.2
LeA	Lockwood shaly loam, 0 to 2 percent slopes	3,610	.2
LeC	Lockwood shaly loam, 2 to 9 percent slopes	27,165	1.3
LeD	Lockwood shaly loam, 9 to 15 percent slopes	12,125	.6
LgA	Lockwood shaly loam, 0 to 2 percent slopes, wet	1,170	.1
LhE	Lopez shaly loam, 15 to 30 percent slopes	1,630	.1
LkF	Los Gatos gravelly loam, 30 to 50 percent slopes	1,880	.1
LkG	Los Gatos gravelly loam, 50 to 75 percent slopes	5,930	.3
LmD	Los Osos clay loam, 9 to 15 percent slopes	1,315	.1
LmE	Los Osos clay loam, 15 to 30 percent slopes	6,115	.3
LmF	Los Osos clay loam, 30 to 50 percent slopes	31,345	1.5
LmG	Los Osos clay loam, 50 to 75 percent slopes	11,300	.5
Ln	Los Osos-Millsholm complex	2,785	.1
MaE	McCoy clay loam, 15 to 30 percent slopes	3,160	.1
MaF	McCoy clay loam, 30 to 50 percent slopes	15,350	.7
MaG	McCoy clay loam, 50 to 75 percent slopes	11,370	.5
MbE	McCoy-Gilroy complex, 15 to 30 percent slopes	3,675	.2
MbG	McCoy-Gilroy complex, 30 to 75 percent slopes	7,745	.4
McG	McCoy gravelly loam, very stony subsoil variant, 30 to 75 percent slopes	1,720	.1
Md	McMullin-Plaskett complex	18,175	.9
Me	Metz loamy sand	3,945	.2
Mf	Metz fine sandy loam	5,745	.3
Mq	Metz complex	19,060	.9
MhG	Millsholm loam, 30 to 75 percent slopes	5,960	.3
Mk	Millsholm-Alo association	9,700	.5
Mm	Millsholm-Gazos complex	8,035	.4
MnA	Mocho silt loam, 0 to 2 percent slopes	12,890	.6
MoA	Mocho silty clay loam, 0 to 2 percent slopes	13,220	.6
MoC	Mocho silty clay loam, 2 to 9 percent slopes	3,880	.2
Mp	Montara-Rock outcrop complex	11,115	.5
NaD	Nacimiento silty clay loam, 9 to 15 percent slopes	4,290	.2
NaE	Nacimiento silty clay loam, 15 to 30 percent slopes	16,550	.8
NaF	Nacimiento silty clay loam, 30 to 50 percent slopes	27,380	1.3
NaG	Nacimiento silty clay loam, 50 to 75 percent slopes	3,200	.2
NbF	Nacimiento-Los Osos complex, 30 to 50 percent slopes	34,765	1.6
NbG	Nacimiento-Los Osos complex, 50 to 75 percent slopes	23,600	1.1
NcC	Narlon loamy fine sand, 2 to 9 percent slopes	4,215	.2
NcE	Narlon loamy fine sand, 15 to 30 percent slopes	990	(1)
OaD	Oceano loamy sand, 2 to 15 percent slopes	13,110	.6
Pa	Pacheco clay loam	8,335	.4
Pb	Pacheco silty clay loam, occasionally flooded	710	(1)
PcC	Parkfield clay, 2 to 9 percent slopes	5,565	.3
PcE	Parkfield clay, 15 to 30 percent slopes	1,505	.1
PdC	Pfeiffer fine sandy loam, 2 to 9 percent slopes	1,040	(1)
PdD	Pfeiffer fine sandy loam, 9 to 15 percent slopes	1,090	.1
Pe	Pfeiffer-Rock outcrop complex	6,775	.3
Pf	Pico fine sandy loam	13,745	.6
PgE	Pinnacles coarse sandy loam, 5 to 30 percent slopes	685	(1)
PhG2	Pinnacles stony sandy loam, 30 to 75 percent slopes, eroded	1,070	.1
PkE	Pinnacles coarse sandy loam, very gravelly subsoil variant, 5 to 30 percent slopes	2,360	.1
PkF	Pinnacles coarse sandy loam, very gravelly subsoil variant, 30 to 50 percent slopes	1,570	.1
Pm	Pits and dumps	550	(1)
PnA	Placentia sandy loam, 0 to 2 percent slopes	3,790	.2
PnC	Placentia sandy loam, 2 to 9 percent slopes	9,775	.5
PnD	Placentia sandy loam, 9 to 15 percent slopes	4,505	.2
PnE	Placentia sandy loam, 15 to 30 percent slopes	2,040	.1

TABLE 1.—*Approximate acreage and proportionate extent of the soils*—Continued

Map symbol	Soil name	Acres	Percent	Map symbol	Soil name	Acres	Percent
PoE	Placentia-Arbuckle complex, 15 to 30 percent slopes	2,090	.1	ShD2	Santa Ynez fine sandy loam, 5 to 15 percent slopes, eroded	700	(1)
Pp	Plaskett-Reliz complex	13,730	.6	ShE	Santa Ynez fine sandy loam, 15 to 30 percent slopes	14,020	.7
Pr	Psamments and Fluvents, occasionally flooded	12,650	.6	SmG3	Shedd silt loam, 30 to 75 percent slopes, severely eroded	46,115	2.2
Ps	Psamments and Fluvents, frequently flooded	9,300	.4	SnD	Shedd silty clay loam, 9 to 15 per cent slopes	3,710	.2
RaA	Rincon clay loam, 0 to 2 percent slopes	5,475	.3	SnE	Shedd silty clay loam, 15 to 30 percent slopes	14,950	.7
RaC	Rincon clay loam, 2 to 9 percent slopes	12,945	.6	SnF2	Shedd silty clay loam, 30 to 50 percent slopes, eroded	25,880	1.2
RaD	Rincon clay loam, 9 to 15 percent slopes	5,360	.3	SoD	Sheridan coarse sandy loam, 5 to 15 percent slopes	570	(1)
RaE	Rincon clay loam, 15 to 30 percent slopes	1,830	.1	SoE	Sheridan coarse sandy loam, 15 to 30 percent slopes	16,850	.8
Rb	Rindge muck	1,365	.1	SoG	Sheridan coarse sandy loam, 30 to 75 percent slopes	75,200	3.5
Rc	Rock outcrop-Xerorthents association	129,000	6.0	SpD	Snelling-Greenfield complex, 5 to 15 percent slopes	3,730	.2
SaA	Salinas loam, 0 to 2 percent slopes	2,555	.1	SpE2	Snelling-Greenfield complex, 9 to 30 percent slopes, eroded	4,540	.2
SbA	Salinas clay loam, 0 to 2 percent slopes	19,665	.9	SrA	Sorrento clay loam, 0 to 2 percent slopes	4,575	.2
SbC	Salinas clay loam, 2 to 9 percent slopes	1,825	.1	SrC	Sorrento clay loam, 2 to 9 percent slopes	5,760	.3
ScE	San Andreas fine sandy loam, 15 to 30 percent slopes	3,555	.2	Ss	Sur-Junipero complex	89,000	4.2
ScG	San Andreas fine sandy loam, 30 to 75 percent slopes	11,580	.5	St	Sur-Plaskett complex	8,675	.4
SdF	San Benito clay loam, 30 to 50 percent slopes	4,520	.2	TaC	Tangair fine sand, 2 to 9 percent slopes	805	(1)
SdG	San Benito clay loam, 50 to 75 percent slopes	8,050	.4	TbB	Tujunga fine sand, 0 to 5 percent slopes	3,925	.2
SeG	San Timoteo gravelly loam, 30 to 75 percent slopes	2,125	.1	VaD	Vista coarse sandy loam, 5 to 15 percent slopes	1,100	.1
SfD	Santa Lucia shaly clay loam, 2 to 15 percent slopes	740	(1)	VaE	Vista coarse sandy loam, 15 to 30 percent slopes	8,055	.4
SfE	Santa Lucia shaly clay loam, 15 to 30 percent slopes	9,800	.5	VaG	Vista coarse sandy loam, 30 to 75 percent slopes	42,700	2.0
SfF	Santa Lucia shaly clay loam, 30 to 50 percent slopes	43,525	2.0	Vb	Vista-Rock outcrop complex	4,825	.2
Sg	Santa Lucia-Reliz association	169,670	8.0	Xa	Xererts-Xerolls complex	5,860	.3
ShC	Santa Ynez fine sandy loam, 2 to 9 percent slopes	8,050	.4	Xb	Xerorthents, sandy	3,735	.2
ShD	Santa Ynez fine sandy loam, 9 to 15 percent slopes	3,410	.2	Xc	Xerorthents, loamy	6,790	.3
				Xd	Xerorthents, dissected	16,625	.8
					Water	10,370	.5
					Total	2,127,360	100.0

[1] Less than 0.1 percent.

slickensides; mildly alkaline; very slightly effervescent with disseminated lime; gradual wavy boundary.

C1ca—30 to 36 inches; light olive brown (2.5Y 5/4) silty clay, olive brown (2.5Y 4/4) when moist; massive; very hard, firm, sticky and very plastic; few very fine roots; common very fine interstitial and tubular pores; moderately alkaline; strongly effervescent with lime disseminated and in few irregular soft bodies; gradual wavy boundary.

C2r—36 to 50 inches; light yellowish brown (2.5Y 6/4) weathered soft shale.

The A1 horizon is dark grayish brown, dark brown, grayish brown or brown. Texture is generally clay or silty clay, but it is heavy clay loam or heavy silty clay loam in some profiles. Common to many intersecting slickensides are in the lower part. Reaction is slightly acid to moderately alkaline. When dry, this soil develops cracks ⅜ inch to 2 inches wide that extend into the C horizon.

The C horizon ranges from brown to light yellowish brown, and texture is clay, silty clay, clay loam, or silty clay loam. Reaction is neutral to moderately alkaline. The soil is calcareous, and lime is disseminated or segregated in soft masses at a depth of 25 to 40 inches. Depth to strongly weathered sandstone or shale ranges from 30 to 40 inches.

AaC—Alo silty clay, 2 to 9 percent slopes. This is a gently sloping and moderately sloping soil on foot slopes in mountainous uplands.

Included with this soil in mapping were small areas of Ayar, Parkfield, Diablo, and Nacimiento soils. Also included were soils that are very similar to this Alo soil, but 40 to 60 inches deep.

Runoff is medium, and the erosion hazard is slight.

This soil is used mostly for range, and a few areas are used for dryfarmed grain. Capability unit IIIe-5 (15); Clayey range site.

AaD—Alo silty clay, 9 to 15 percent slopes. This is a rolling soil on foot slopes on uplands.

Included with this soil in mapping were small areas of Ayar, Nacimiento, and Diablo soils. Also included was a soil that is similar to this Alo soil, but is 40 to 60 inches deep to bedrock and has a surface layer of clay and a subsoil of heavy clay.

Runoff is medium, and the erosion hazard is moderate.

This soil is used mostly for range, and some small areas are used for dryfarmed grain. Capability unit IIIe–5 (15) ; Clayey range site.

AaE—Alo silty clay, 15 to 30 percent slopes. This is a hilly soil on side slopes on uplands.

Included with this soil in mapping were small areas of Ayar, Los Osos, Millsholm, Diablo, Nacimiento, Gazos, and Parkfield soils. Also included were areas of Alo soils that are subject to moderate sheet and rill erosion.

Runoff is rapid, and the erosion hazard is moderate.

This soil is used mostly for range, and a few areas are used for dryfarmed grain. Capability unit IVe–5 (15) ; Clayey range site.

AaF—Alo silty clay, 30 to 50 percent slopes. This is a steep soil on uplands. It has the profile described as representative of the series.

Included with this soil in mapping were areas of Los Osos, Millsholm, Nacimiento, Diablo, Gazos, Ayar, and Linne soils. Also included were areas of Alo soils that have large gullies, areas of landslips, and areas of a soil that is 40 to 60 inches deep to bedrock.

Runoff is rapid, and the erosion hazard is moderate to high.

This Alo soil is used for range and watershed. Capability unit VIe–1 (15) ; Clayey range site.

Ab—Alo-Millsholm complex. This mapping unit is on low hills. Generally Alo soils are on toe slopes and Millsholm soils are on side slopes. The soils are so intermingled that it was not practical to separate them at the scale used in mapping. Slopes are 30 to 45 percent.

Alo soils make up about 45 percent of this complex and Millsholm soils 30 percent. The rest consists of areas of Diablo, Nacimiento, Gazos, Linne, Los Osos, and Gaviota soils and rock outcrop.

Runoff is rapid on both major soils. The erosion hazard is moderate on Alo soils and high on Millsholm soils.

This complex is used for range, wildlife habitat, and watershed. Capability unit VIe–1 (15) ; Alo soil in Clayey range site, Millsholm soil in Shallow Loamy range site.

Alviso Series

The Alviso series consists of very poorly drained soils that formed in alluvium derived from sedimentary rocks. These soils are in basins and on tidal flats that have branched meander channels flushed by sea water and some fresh water. Slopes are 0 to 2 percent. The vegetation is mostly hydrophytic plants, such as pickleweed and saltgrass. The elevation ranges from about 1 foot below sea level to about 3 feet above sea level. The mean annual precipitation is 12 to 21 inches, the mean annual air temperature is 55° to 57° F, and the frost-free season is about 330 days. Summers are cool and foggy, and winters are cool and moist.

In a representative profile the surface layer is gray, neutral silty clay loam 5 inches thick. Below that is 9 inches of light gray, mildly alkaline silty clay loam underlain by 31 inches of gray and light gray, mildly alkaline silty clay. At a depth of 45 inches is greenish gray, slightly acid very fine sand that extends to a depth of more than 60 inches.

Permeability is slow, and the available water capacity is 3.5 to 7.5 inches. Roots penetrate to a depth of more than 60 inches. A water table is at a depth of 6 to 24 inches.

Alviso soils are used mostly for wildlife habitat and recreation. When drained they are used for pasture and artichokes.

Representative profile of Alviso silty clay loam, about 1 mile south of Moss Landing on Tembladero Slough; 0.4 mile west on Potrero Road from Moss Landing Road, 660 feet north (100 feet beyond dike).

O1—½ inch to 0; discontinuous layer of plant remains, 0 to 1 inch thick.

A1g—0 to 5 inches; gray (5Y 5/1) silty clay loam, dark olive gray (5Y 3/2) when moist; moderate medium angular blocky structure; hard, friable, sticky and plastic; few fine and common very fine roots; few very fine interstitial pores and few very fine tubular pores; neutral; gradual smooth boundary.

C1g—5 to 14 inches; light gray (5Y 6/1) silty clay loam, dark gray (5Y 4/1) when moist; common fine prominent brown (7.5YR 5/4) mottles; moderate medium angular blocky structure; hard, friable, sticky and plastic; many very fine and fine roots; few very fine interstitial pores and common very fine and few fine tubular pores; mildly alkaline; clear smooth boundary.

C2g—14 to 45 inches; gray and light gray (N 7/0, 6/0, 5/0) silty clay, dark gray (5Y 4/1) when moist; common medium distinct olive (5Y 5/3) mottles; moderate medium angular blocky structure; very hard, friable, sticky and plastic; common very fine roots; few very fine and fine tubular pores; mildly alkaline; layer of organic material ½ inch thick near top of horizon, several dark greenish gray and grayish green (5GY 4/1, 5G 4/2) moist seams ⅛ to ½ inch thick, color becomes more greenish in lower portion of horizon; a few small 2 to 5 millimeter concretions; gradual smooth boundary.

IIC3g—45 to 60 inches; greenish gray (5GY 6/1) very fine sand, very dark greenish gray (5BG 2/1) when moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; no roots observed; many very fine interstitial pores; slightly acid.

A thin, discontinuous organic layer of plant residue is on the surface in places. The A1g horizon ranges from gray to dark gray dry and from black to very dark grayish brown moist. Texture is silty clay or silty clay loam, and reaction ranges from neutral to moderately alkaline.

The C horizon ranges from neutral to moderately alkaline. In places it is stratified organic material and lenses of coarser textures, and one layer is at least 20 inches thick. The IIC3g horizon has gleyed colors in hues of 5GY, 5BG, and 5B. Texture is commonly fine sand, very fine sand, or fine sandy loam, but it ranges from sand to silty clay. Reaction ranges from slightly acid to moderately alkaline.

Ac—Alviso silty clay loam. This is a nearly level soil in basins and on tidal flats. It has the profile described as representative of the series.

Included with this soil in mapping were areas of a soil that has stratified organic matter and mineral soils that are more than 35 percent clay in layers, less than 20 inches thick. Also included were areas of soils that have less than 35 percent clay to a depth of more than 40 inches.

The water table is at a depth of 6 to 12 inches and generally restricts most plant roots. Water is commonly ponded or runs off very slowly. The erosion hazard is minimal. This soil is affected by salts.

This Alviso soil is used mostly for wildlife habitat and recreation. One small area on Elkhorn Slough is used as evaporation beds for salt. Capability unit VIIIw–1 (15) ; range site not assigned.

Ad—Alviso silty clay loam, drained. This is a nearly level soil in basins and on tidal flats. It has been partly drained by dikes, levees, and gates to control the inflow of tidewater. It has a profile similar to the one described as representative of the series, but the surface layer is 8 to 19 inches thick.

Included with this soil in mapping were areas of Pacheco and Clear Lake soils and a soil that is similar to this Alviso soil, but has a light brownish gray surface layer.

The water table has been lowered to a depth of 12 to 24 inches. Runoff is very slow, and the erosion hazard is minimal. This soil is affected by salts.

This soil is used for annual pasture and hay and for artichokes. Control of the water quality and the water table level is difficult. Capability unit VIw–1 (14) ; range site not assigned.

Antioch Series

The Antioch series consists of moderately well drained soils that formed in alluvium derived from sedimentary rocks on alluvial fans and terraces. Slopes are 0 to 15 percent. The vegetation is annual grasses and forbs. The elevation is 25 to 1,100 feet. The mean annual precipitation is 12 to 15 inches, the mean annual air temperature is 57° to 61° F, and the frost-free season is about 250 days. Summers are warm and dry, except in the northern part of the Salinas Valley, where they are foggy, and winters are cool and moist.

In a representative profile the surface layer is grayish brown, strongly acid very fine sandy loam 15 inches thick (fig. 1). The subsurface layer is light gray, slightly acid very fine sandy loam 6 inches thick. The subsoil extends to a depth of 67 inches. The upper 19 inches is dark grayish brown and brown, yellowish brown and brown, and yellowish brown, moderately alkaline clay. The lower 27 inches is light yellowish brown, moderately alkaline, calcareous clay loam and very pale brown, moderately alkaline, calcareous sandy clay loam. Below that is very pale brown, moderately alkaline sandy loam that extends to a depth of more than 72 inches.

Permeability is very slow. The available water capacity is 4 to 5 inches, and some water is available above the clay subsoil. Roots can generally penetrate to a depth of more than 60 inches, but root-sensitive crops may be restricted to a depth of 18 to 24 inches by the clay subsoil.

Antioch soils are used for irrigated row and field crops, dryfarmed hay and grain, and annual dryland pasture.

Representative profile of Antioch very fine sandy loam, 0 to 2 percent slopes, 900 feet NW of Hartnell Road on Alisal Road, 180 feet SW of Hernandes farm road, 156 feet northwest into field from fence.

Figure 1.—**A typical profile of Antioch very fine sandy loam, 0 to 2 percent slopes.**

Ap—0 to 4 inches; grayish brown (10YR 5/2) very fine sandy loam, dark brown (10YR 3/3) when moist; weak very thick platy structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; many very fine tubular pores; strongly acid; clear smooth boundary.

A12—4 to 15 inches; grayish brown (10YR 5/2) very fine sandy loam, dark brown (10YR 3/3) when moist; weak coarse subangular blocky structure; hard and slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; many very fine and few medium tubular pores; strongly acid; clear wavy boundary.

A2—15 to 21 inches; light gray (10YR 7/2) very fine sandy loam, pale brown (10YR 6/3) when moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; many very fine and few medium tubular and interstitial pores; some tonguing of the A1 horizon into this horizon; slightly acid; abrupt wavy boundary.

B21t—21 to 27 inches; mixed dark grayish brown (10YR 4/2) and brown (10YR 5/3) clay, very dark grayish brown (10YR 3/2) and brown (10YR 5/3) when moist; strong coarse columnar strutcure; extremely hard, very firm, very sticky and very plastic; few very fine flattened roots concentrated along

peds; common very fine tubular pores; continuous moderately thick clay films on peds and continuous thin clay films lining pores; very dark grayish brown (10YR 3/2) organic coatings on peds; material from the lower inch of the A2 horizon (10YR 5/3) is mixed with this horizon; moderately alkaline; gradual smooth boundary.

B22t—27 to 32 inches; mixed yellowish brown (10YR 5/4) and brown (10YR 4/3) clay, dark yellowish brown (10YR 4/4) and dark brown (10YR 4/3) when moist; strong coarse prismatic structure; extremely hard, very firm, very sticky and very plastic; few very fine roots; common very fine tubular pores; continuous moderately thick clay films on peds and lining pores; black (10YR 2/1) stains and very dark grayish brown (10YR 3/2) organic coatings on peds; moderately alkaline; gradual smooth boundary.

B23t—32 to 40 inches; yellowish brown (10YR 5/4) clay; dark yellowish brown (10YR 4/4) when moist; moderate medium angular blocky structure; extremely hard, firm, very sticky and very plastic; few very fine roots; common very fine tubular pores; continuous moderately thick clay films on peds and lining pores; black (10YR 2/1) stains on peds; moderately alkaline; gradual smooth boundary.

B31tca—40 to 52 inches; light yellowish brown (10YR 6/4) clay loam, dark yellowish brown (10YR 4/4) when moist; moderate fine angular blocky structure; extremely hard, firm, sticky and plastic; very few very fine roots; common very fine pores; continuous moderately thick clay films on peds and many thick clay films lining pores; black (10YR 2/1) stains on peds; moderately alkaline; violently effervescent, lime occurs as concretions and in seams; gradual smooth boundary.

B32tca—52 to 67 inches; very pale brown (10YR 7/4) sandy clay loam, yellowish brown (10YR 5/4) when moist; weak coarse angular blocky structure; hard, firm, sticky and plastic; very few very fine roots; common very fine tubular pores; many moderately thick films on peds and lining pores; moderately alkaline; very strongly effervescent with disseminated lime; gradual smooth boundary.

C—67 to 72 inches; very pale brown (10YR 7/4) sandy loam, yellowish brown (10YR 5/6) when moist; massive; slightly hard, friable, nonsticky and nonplastic; many very fine tubular pores; moderately alkaline; noncalcareous.

The Ap and A12 horizons are dark grayish brown, gray, grayish brown, or brown. Texture is typically very fine sandy loam, but is sandy loam, sandy clay loam, clay loam, or silty clay loam in places. Reaction is strongly acid or medium acid. The A2 horizon is light gray or very pale brown, and texture is fine sandy loam, very fine sandy loam, silt loam, or sandy clay loam. Reaction ranges from medium acid to moderately alkaline. Concretions are at a depth of 0 to 21 inches.

Depth to the B2t horizon typically is 18 to 24 inches. This horizon ranges from dark grayish brown to yellowish brown and, in the Castroville area, is light yellowish brown, light olive brown, pale olive, and olive. It ranges from neutral to moderately alkaline and in places is calcareous in the lower part. The B3 horizon ranges from yellowish brown to very pale brown. Texture is clay, clay loam, or sandy clay loam.

The C horizon is yellowish brown, light yellowish brown, or very pale brown. Texture is clay loam, sandy clay loam, loam, or sandy loam. In places this horizon is calcareous in the upper part.

AeA—Antioch very fine sandy loam, 0 to 2 percent slopes. This is a nearly level soil on terraces or alluvial fans. It has the profile described as representative of the series.

Included with this soil in mapping were small areas of Chualar, Gloria, Placentia, Cropley, Salinas, Danville, Santa Ynez, and Rincon soils. Also included were areas where intensive cropping has changed reaction in the surface layer to slightly acid to mildly alkaline and areas where the surface layer is light brownish gray or light gray.

Runoff is slow or very slow, and the erosion hazard is minimal.

This Antioch soil is used mostly for irrigated field and row crops, dryfarmed grain and hay, and dryland annual pasture. Some small areas are used for homesites and related uses. Capability unit IIIs–3(14); Claypan range site.

AeC—Antioch very fine sandy loam, 2 to 9 percent slopes. This is a gently sloping and moderately sloping soil on terraces and alluvial fans.

Included with this soil in mapping were small areas of other Antioch soils, areas where the soil has been altered by land smoothing and the subsoil is at or very near the surface, and some areas where past fieldwork has made the surface layer slightly acid to mildly alkaline.

Runoff is slow to medium, and the erosion hazard is slight to moderate.

This Antioch soil is used for irrigated field and row crops, dryfarmed hay and grain, and irrigated or dryland pasture. Capability unit IIIe–3(14); Claypan range site.

AeD—Antioch very fine sandy loam, 9 to 15 percent slopes. This is a strongly sloping soil on alluvial fans, terraces, and terrace escarpments.

Included with this soil in mapping were small areas of Placentia, Gloria, Cropley, Clear Lake, and Salinas soils. Also included were some areas where the subsoil is exposed and some deeply gullied areas that are severely eroded.

Runoff is medium, and the erosion hazard is moderate.

This soil is used mostly for range, wildlife habitat, and watershed. Capability unit IVe–3(14); Claypan range site.

Aquic Xerofluvents

Af—Aquic Xerofluvents. This mapping unit consists of stratified sand, sandy loam, silt loam, clay loam, and clay in layers 1 to 24 inches thick. It formed in mixed alluvium on small flood plains and in areas adjacent to drainageways. Reaction ranges from slightly acid to mildly alkaline. The organic-matter content varies by stratum. This unit is somewhat poorly drained, and some areas are subject to intermittent flooding during high-intensity storms. Channel cutting and deposition occur in some places. Slopes are 0 to 5 percent. The elevation is 300 to 1,500 feet. The vegetation is grasses and forbs; oak, willows, sycamores, and other trees; and some brush.

Small areas of Chualar, Salinas, Danville, Clear Lake, Pacheco, Elder, and Arroyo Seco soils were included in mapping.

Permeability and the available water capacity are variable, depending upon the amount and degree of stratification. Roots can penetrate to a depth of 48 to 60 inches, where they are restricted by the water table. Runoff is slow, and the erosion hazard is slight to moderate because of concentrated flows of water from surrounding areas.

This land type is used mostly for annual pasture.

When protected from flooding, some areas are used for irrigated row crops. Capability unit IVw–4(15); range site not assigned.

Arbuckle Series

The Arbuckle series consists of well drained soils that formed on terraces in semiconsolidated alluvium derived from igneous and sedimentary rocks. Slopes are 2 to 15 percent. The vegetation is scattered coast live oak, valley white oak, and annual grasses. The elevation is 100 to 1,100 feet. The mean annual precipitation is 12 to 18 inches, the mean annual air temperature is 58° to 60° F, and the frost-free season is about 200 days. Summers are hot and dry, and winters cool and moist.

In a representative profile the surface layer is light brownish gray, neutral gravelly loam 17 inches thick. The subsoil extends to a depth of 46 inches. The upper 11 inches is pale brown, slightly acid gravelly clay loam; the lower 18 inches is light brown, slightly acid gravelly clay loam. The substratum is pink, slightly acid very gravelly loam that extends to a depth of more than 60 inches.

Permeability is moderately slow, and the available water capacity is 6 to 7 inches. Roots can penetrate to a depth of more than 60 inches.

Arbuckle soils are used for irrigated field crops, pasture, and dryfarmed grain. Some areas are used for range.

Representative profile of Arbuckle gravelly loam, 2 to 9 percent slopes, about 1.4 miles east from Lockwood Store on Bradley-Jolon Road, about 200 feet NW from barbwire gate entrance to field in NW¼NW¼ sec. 13, T. 23 S., R. 8 E.

Ap—0 to 8 inches; light brownish gray (10YR 6/2) gravelly loam, dark grayish brown (10YR 4/2) when moist; massive; hard, friable, sticky and slightly plastic; common very fine and fine roots; many very fine and fine tubular and interstitial pores; 15 percent gravel up to 2 inches in diameter; neutral; clear smooth boundary.

A12—8 to 17 inches; light brownish gray (10YR 6/2) gravelly loam, dark grayish brown (10YR 4/2) when moist; weak medium subangular blocky structure; hard, friable, sticky and slightly plastic; common very fine and fine roots; common very fine and fine tubular and interstitial pores; 15 percent gravel up to 2 inches in diameter; neutral; clear smooth boundary.

B1t—17 to 28 inches; pale brown (10YR 6/3) gravelly clay loam, brown (10YR 4/3) when moist; massive; hard, friable, sticky and plastic; few very fine and fine roots; common very fine and fine tubular and interstitial pores; common thin clay films lining pores and bridging grains; 25 percent gravel up to 2 inches in diameter; slightly acid; gradual wavy boundary.

B21t—28 to 37 inches; light brown (7.5YR 6/4) gravelly clay loam, dark brown (7.5YR 4/4) when moist; massive; very hard, friable, sticky and plastic; few very fine roots; common very fine and few fine interstitial pores; common moderately thick clay films lining pores and bridging grains; 25 percent gravel up to 2 inches in diameter; slightly acid; gradual wavy boundary.

B22t—37 to 46 inches; light brown (7.5YR 6/4) gravelly clay loam, dark brown (7.5YR 4/4) when moist; massive; very hard, friable, sticky and plastic; very few very fine roots; common very fine and few fine interstitial pores; common moderately thick clay films lining pores and bridging grains; 25 percent gravel up to 2 inches in diameter, slightly acid; gradual wavy boundary.

IIC—46 to 60 inches; pink (7.5YR 7/4) very gravelly loam, yellowish brown (7.5YR 5/4) when moist; massive; hard, friable, sticky and slightly plastic; 50 percent gravel up to 3 inches in diameter; slightly acid.

The A horizon is brown, grayish brown, light brownish gray or pale brown. Texture is typically gravelly loam, but is gravelly sandy loam or gravelly coarse sandy loam in places. Gravel content ranges from 15 to 20 percent. Reaction ranges from medium acid to neutral. The A3 horizon, where present, is gravelly loam or gravelly sandy loam.

The Bt horizon ranges from brown to light yellowish brown. Texture is gravelly clay loam, gravelly sandy clay loam, or gravelly loam; gravel content ranges from 20 to 35 percent. Reaction is medium acid to neutral. The Bt horizon is weakly cemented below a depth of 40 inches in some places.

The IIC horizon is light brown, pink, or light yellowish brown. Gravel content is 35 to 70 percent. Reaction ranges from medium acid to moderately alkaline.

AgC—Arbuckle gravelly loam, 2 to 9 percent slopes. This is a gently undulating and gently rolling soil on terraces. It has the profile described as representative of the series.

Included with this soil in mapping were small areas of Lockwood, Rincon, Chamise, Cropley, and Alo soils.

Runoff is medium, and the erosion hazard is moderate.

This Arbuckle soil is used for dryfarmed grain or hay, irrigated field crops, and annual pasture. Capability units IIe–4(14) and IIIe–4(15); range site not assigned.

AgD—Arbuckle gravelly loam, 9 to 15 percent slopes. This is a rolling soil on rounded terraces.

Included with this soil in mapping were areas of Lockwood, Placentia, Rincon, Chamise, and Pinnacles soils.

Runoff is medium, and the erosion hazard is moderate.

This soil is used for dryfarmed grain and annual pasture. Capability unit IIIe–4(15); range site not assigned.

Arnold Series

The Arnold series consists of somewhat excessively drained soils that formed on hills and uplands in old marine sand dunes or in materials weathered from soft sandstone. Slopes are 9 to 75 percent. The vegetation is grasses, forbs, oaks, chamise, manzanita, and eucalyptus. The elevation is 100 to 2,000 feet. The mean annual precipitation is 15 to 30 inches, the mean annual air temperature is 57° to 59° F, and the frost-free season is 230 to 280 days. Summers are warm and dry, except in the northern Salinas Valley where they are foggy, and winters are cool and moist.

In a representative profile the surface layer is dark brown, slightly acid loamy sand 8 inches thick. Below this is mixed brown and strong brown, slightly acid loamy fine sand underlain by soft sandstone at a depth of 48 inches.

Permeability is rapid, and the available water capacity is 3 to 5 inches. Roots penetrate to a depth of more than 60 inches.

Arnold soils are used for range, wildlife habitat, and watershed. Some areas are used for eucalyptus or oak firewood or for Christmas trees.

Representative profile of Arnold loamy sand, 15 to 50 percent slopes, 1,300 feet west of U.S. Highway 101, 0.08 mile north of State Highway 156, about 25 feet west of McGuffie Road.

A1—0 to 8 inches; brown (10YR 5/3) loamy sand, dark brown (7.5YR 3/2) when moist; massive; slightly hard and soft, very friable, nonsticky and nonplastic; common fine and many very fine roots; common fine tubular pores and many very fine interstitial pores; slightly acid; clear wavy boundary.

AC—8 to 28 inches; mixed brown and strong brown (7.5YR 5/4 and 5/6) loamy fine sand, dark brown (7.5YR 4/4) when moist; enough black (N/2) sand to show as specks; massive; hard and slightly hard, very friable, nonsticky and nonplastic; many coarse roots in upper 5 inches, few medium and very few fine and very fine roots; many very fine interstitial pores and common fine and very fine tubular pores; slightly acid; gradual irregular boundary.

C1—28 to 48 inches; mixed brown and strong brown (7.5YR 5/4 and 5/6) loamy fine sand, dark brown (7.5YR 4/4) when moist; massive, structure appears very weak very coarse subangular blocky in places; hard, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine interstitial pores and common fine and very fine tubular pores; common thin clay films bridging sand grains in strong brown part; about 2 percent more clay in strong brown part; slightly acid; gradual irregular boundary.

C2r—48 to 61 inches; light yellowish brown (10YR 6/4) and strong brown (7.5YR 5/6) soft sandstone that crushes easily to loamy fine sand; slightly acid.

The A horizon ranges from dark grayish brown to pale brown dry and from very dark grayish brown to yellowish brown moist. Texture is loamy sand, sand, or loamy fine sand, and reaction ranges from medium acid to neutral.

The B horizon, where present, is slightly more firm or compact than the A horizon and has higher chroma, redder hue, or thin clay films. This horizon is light brown or very pale brown to light brownish gray or dark yellowish brown. Texture is sand, loamy sand, or loamy fine sand, and reaction is neutral to strongly acid.

The C1 horizon ranges from strong brown to light brownish gray or very pale brown. Texture ranges from sand to loamy fine sand, and reaction is medium acid to slightly acid. The C2r horizon, or sandstone, is at a depth of 40 to 60 inches. About 2 to 15 percent iron, cemented, rounded concretions are throughout the profile in some places. These concretions typically are 1/32 to 1/4 inch in diameter, but range to 1/2 inch.

AkD—Arnold loamy sand, 9 to 15 percent slopes. This is a strongly sloping soil on foot slopes and broad ridges on uplands.

Included with this soil in mapping were small areas of Oceano, Elkhorn, and Santa Ynez soils and Arnold loamy sand, 15 to 50 percent slopes. Also included were small, severely eroded areas on wide ridges, especially on escarpments that have an exposed substratum of sandstone and sandy sediments; areas of loamy fine sand to sandy alluvium and colluvium that have slopes of 2 to 9 percent and are on the lower foot slopes that extend into narrow valleys and drainageways; and some areas that are underlain by sandy loam to clay below a depth of 40 inches. Some areas that have sheet and rill erosion and some gullied areas in drainageways were also included. Small areas of Placentia and Chualar soils in the southeastern part of Monterey County in upper Deer Canyon are part of this mapping unit.

Runoff is medium, and the erosion hazard is moderate.

This soil is used for strawberries, some orchard and row crops, and annual pasture or range. In the Prunedale area it is used for homesites. Capability unit IVe–4 (15); Sandy range site.

AkF—Arnold loamy sand, 15 to 50 percent slopes. This is a moderately steep to steep soil on uplands. It has the profile described as representative of the series.

Included with this soil in mapping were many small areas of Oceano soils and Arnold loamy sand, 9 to 15 percent slopes; areas of deep and very deep sandy colluvium in small valleys and drainageways; and small severely eroded areas near the tops of slopes, on ridges, or on escarpments that have an exposed substratum of sandstone or sandy sediments. Areas of San Andreas soils on north- and east-facing side slopes and areas of other soils that have a surface layer of dark grayish brown and grayish brown sand to loamy fine sand more than 10 inches thick were also included. From Aromas west to Elkhorn Slough and south to Prunedale, areas of Elkhorn soils that have less than 35 percent slopes and small areas of Santa Ynez soils were included. Also included were small areas of soils that are underlain by sandy loam to clay at a depth of more than 40 inches and small areas of landslides. San Andreas, Santa Ynez, Chamise, and Santa Lucia soils are part of this mapping unit in the Corral de Tierra and San Benacio Canyon areas and in the Carmel Valley.

Runoff is rapid, and the erosion hazard is high.

This soil is used mostly for range, wildlife habitat, and watershed. A few areas are used for the production of firewood or Christmas trees. In the vicinity of Prunedale, Aromas, and Castroville, this soil is used for homesites. Capability unit VIIe–1(15); Sandy range site.

Am—Arnold-San Andreas complex. This mapping unit is on hills and escarpments. Arnold soils are generally on south-facing side slopes. They have sparse vegetation and are eroded in places. San Andreas soils are on north-facing side slopes, are well vegetated, and are generally not eroded. The soils are so intermingled that it was not feasible to map them separately at the scale used. Slopes are 50 to 75 percent.

Arnold and San Andreas soils each make up about 25 percent of the complex. The rest consists of a soil that has a grayish brown surface layer more than 20 inches thick, a light brownish gray sandy loam, a soil that is less than 20 inches deep to soft sandstone, and areas of Rock outcrop or Badland.

The San Andreas soil has an available water capacity of 4 to 6 inches, and roots can penetrate to a depth of 20 to 40 inches. Runoff is rapid to very rapid, and the erosion hazard is high.

This complex is used for range, watershed, and wildlife habitat. Capability unit VIIe–1(15); Arnold soil in Sandy range site, San Andreas soil in Coarse Loamy range site.

Ar—Arnold-Santa Ynez complex. This mapping unit is on dissected terrace remnants, hilltops, and wide ridge tops. The soils are so intermingled that it was not feasible to map them separately at the scale used. Arnold soils make up about 40 percent of this complex and Santa Ynez soils 25 percent. The rest consists of areas of Elkhorn soils, a loamy sand or sand that is 10 to 20 inches deep to bedrock, a soil that has a sub-

soil of sandy loam to sandy clay loam, and areas of strongly sloping to very steep, severely eroded banks or escarpments that have exposed cemented sandy alluvium or sandstone outcrops. Slopes are 9 to 30 percent.

The Santa Ynez soil has an available water capacity of 2 to 4 inches, and some water is held available for plants above the subsoil. Roots can penetrate to a depth of 16 to 24 inches. Runoff is medium to rapid, and the erosion hazard is moderate to high.

This complex is used mostly for military purposes, but some areas are used for range, wildlife habitat, and watershed. Capability unit VIe–1(15); Arnold soil in Sandy range site, Santa Ynez soil in Claypan range site.

Arroyo Seco Series

The Arroyo Seco series consists of well drained soils that formed in granitic alluvium on alluvial fans and plains. Slopes are 0 to 9 percent. The vegetation is annual grasses and a few scattered oaks. The elevation is 100 to 3,000 feet. The mean annual precipitation is 12 to 30 inches, the mean annual air temperature is 58° to 60° F, and the frost-free season is 210 to 260 days. Summers are hot and dry, and winters are cool and moist.

In a representative profile the surface layer is grayish brown, neutral and mildly alkaline gravelly sandy loam 29 inches thick. The underlying material is brown, mildly alkaline gravelly sandy loam 13 inches thick and yellowish brown, mildly alkaline very gravelly coarse sandy loam.

Permeability is moderately rapid. Most roots can penetrate to a depth of more than 60 inches, but the very gravelly underlying material limits the available water capacity and nutrient storage for some plants.

Arroyo Seco soils are used for irrigated row and field crops, dryland pasture, and dryfarmed grain. A few areas are used for orchards or vineyards.

Representative profile of Arroyo Seco gravelly sandy loam, 0 to 2 percent slopes, 300 feet SW of the town of Greenfield, SW of Greenfield-Arroyo Seco Road intersection, or 375 feet SW of 12th Street, then 500 feet SE on field road and 300 feet SW into field.

Ap—0 to 5 inches; grayish brown (10YR 5/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) when moist; cloddy; slightly hard, very friable, nonsticky and nonplastic; common very fine roots; common very fine interstitial pores; 15 percent gravel, 2 percent cobblestones; neutral; clear smooth boundary.

A12—5 to 18 inches; grayish brown (10YR 5/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) when moist; weak coarse subangular blocky structure; hard, friable, nonsticky and nonplastic; few very fine roots; common very fine tubular and interstitial pores; 20 percent gravel, 5 percent cobblestones; mildly alkaline; gradual wavy boundary.

A13—18 to 29 inches; grayish brown (10YR 5/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) when moist; massive; slightly hard, very friable, slightly sticky and nonplastic; few very fine roots; common very fine tubular pores; 25 percent gravel, 10 percent cobblestones; mildly alkaline; gradual wavy boundary.

C1—29 to 42 inches; brown (10YR 5/3) gravelly sandy loam, dark brown (10YR 3/3) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; no roots observed; common very fine tubular pores; 25 percent gravel, 10 percent cobblestones; mildly alkaline; abrupt irregular boundary.

IIC2—42 to 60 inches; yellowish brown (10YR 5/4) very gravelly coarse sandy loam, dark yellowish brown (10YR 4/4) when moist; massive; 50 percent gravel, 20 percent cobblestones, 5 percent stones; mildly alkaline.

Coarse fragments make up about 10 to 35 percent of the A horizon. They are typically rounded or angular granitic or schistose gravel or cobblestones. The A horizon is grayish brown, dark gray, dark grayish brown, or brown. The A horizon, if not disturbed by tillage, is massive and slightly hard or has subangular blocky structure and is hard. Reaction is slightly acid to moderately alkaline, and texture is gravelly sandy loam, gravelly fine sandy loam, or gravelly loam.

The C1 horizon is gravelly sandy loam, gravelly fine sandy loam, or gravelly loam. It has 15 to 35 percent gravel and cobblestones. It is brown, grayish brown, yellowish brown, pale brown, or light yellowish brown, and reaction is neutral to moderately alkaline. In some profiles the A horizon rests directly over the IIC horizon at a depth of 40 to 60 inches. The IIC horizon has 50 to 85 percent gravel, cobblestones, and stones.

AsA—Arroyo Seco gravelly sandy loam, 0 to 2 percent slopes. This is a nearly level soil on alluvial fans and plains. It has the profile described as representative of the series.

Included with this soil in mapping were small areas of Hanford, Chualar, Danville, Tujunga, Gorgonio, and Mocho soils. Also included were areas of a soil that is similar to this Arroyo Seco soil, but the gravelly and cobbly substratum is at a depth of about 24 to 40 inches. Areas that have a cobbly surface layer were also included.

Runoff is slow, and the erosion hazard is slight. The available water capacity is 4 to 6 inches and is reduced somewhat by the coarse fragments in the profile, especially in the underlying material.

This soil is used mostly for irrigated row and field crops. Some areas are used for orchards and vineyards. Capability unit IIIs–4(14); range site not assigned.

AsB—Arroyo Seco gravelly sandy loam, 2 to 5 percent slopes. This is a gently sloping soil on alluvial fans and plains.

Included with this soil in mapping were small areas of Hanford, Elder, Chualar, Danville, and Tujunga soils. Also included were areas where the very gravelly and cobbly substratum is at a depth of 24 to 40 inches and areas that have a cobbly surface layer. On the Hunter-Liggett Military Reservation, areas of Lockwood, Santa Ynez, and Chamise soils were also included.

Runoff is slow, and the erosion hazard is slight. The available water capacity is 4 to 6 inches and is reduced by the coarse fragments in the soil.

This Arroyo Seco soil is used mostly for irrigated row and field crops. A few areas are used for orchards and vineyards or dryfarmed hay and grain. Capability unit IIIe–4(14); range site not assigned.

AsC—Arroyo Seco gravelly sandy loam, 5 to 9 percent slopes. This is a moderately sloping soil on alluvial fans. It has a profile similar to the one described as representative of the series, but the surface layer is dark gray, a few cobblestone are on the surface, and up to 20 percent cobblestones and stones are throughout the profile.

Included with this soil in mapping were areas of Elder, Gorgonio, Chualar, Placentia, Gloria, and Danville soils and Fluvents, stony, and Xerorthents, sandy. Also included were areas of Arroyo Seco soils that have more than 35 percent gravel below a depth of 20 inches and areas where slopes range from less than 5 percent to as steep as 18 percent.

Runoff is medium, and the erosion hazard is moderate. The available water capacity is 4 to 6 inches.

This soil is used mostly for annual pasture and dry-farmed hay and grain. A few areas in the Salinas Valley are irrigated and used for row or field crops, and one area west of Soledad is used for citrus. Capability unit IIIe-4(15); range site not assigned.

AvA—Arroyo Seco gravelly loam, 0 to 2 percent slopes. This is a nearly level soil on alluvial fans. It has a profile similar to the one described as representative of the series, but it is about 20 percent sharp, angular gravel 2 to 5 millimeters in diameter and the surface layer is dark gray.

Included with this soil in mapping were areas of Gorgonio, Elder, Chualar, and Danville soils.

Runoff is slow, and the erosion hazard is slight. The available water capacity is 5 to 7 inches.

This soil is used mostly for irrigated field and row crops. Capability unit IIs-4(14); range site not assigned.

AvB—Arroyo Seco gravelly loam, 2 to 5 percent slopes. This is a gently sloping soil on alluvial fans. It has a profile similar to the one described as representative of the series, but the surface layer is dark gray and contains about 20 percent sharp, angular gravel 2 to 5 millimeters in diameter. The substratum, below a depth of 40 to 48 inches, is loamy coarse sand or fine gravelly coarse sandy loam.

Included with this soil in mapping were small areas of Gorgonio, Elder, Chualar, and Danville soils. Also included were soils that are similar to this Arroyo Seco soil, but have less than 10 percent fine gravel throughout the profile.

Runoff is slow, and the erosion hazard is slight. The available water capacity is 5 to 7 inches.

This Arroyo Seco soil is used mostly for irrigated field and row crops. Capability unit IIe-4(14); range site not assigned.

Ayar Series

The Ayar series consists of well drained soils that formed on uplands in material weathered from calcareous shale and sandstone. Slopes are 5 to 50 percent. The vegetation is mainly annual grasses and forbs. The elevation is 200 to 2,200 feet. The mean annual precipitation is 13 to 25 inches, the mean annual air temperature is 59° to 61° F, and the frost-free season is about 220 days. Summers are hot and dry, and winters are cool and moist.

In a representative profile the surface layer is brown and grayish brown, moderately alkaline silty clay about 24 inches thick. Below this is brown and pale brown, moderately alkaline silty clay underlain by calcareous sandstone at a depth of 45 inches.

Permeability is slow, and the available water capacity is 6 to 9 inches. Roots penetrate to a depth of 40 to 60 inches.

Ayar soils are used for dryland grain and range.

Representative profile of Ayar silty clay, 15 to 30 percent slopes, about 12 miles west of Greenfield at the confluence of Paloma and Task Creeks.

A11—0 to 1 inch; brown (10YR 5/3) silty clay, dark brown (10YR 3/3) when moist; strong fine granular structure; slightly hard, friable, sticky and plastic; many very fine roots; many very fine and fine interstitial pores; slightly effervescent with disseminated lime; moderately alkaline; abrupt smooth boundary.

A12—1 inch to 12 inches; grayish brown (10YR 5/2) silty clay, dark brown (10YR 3/3) when moist; massive; hard, firm, sticky and plastic; many very fine roots; many very fine tubular and interstitial pores; slightly effervescent with lime disseminated and in soft masses; moderately alkaline; abrupt smooth boundary.

A13—12 to 24 inches; grayish brown (10YR 5/2) silty clay, dark brown (10YR 4/3) when moist; massive; extremely hard, firm, very sticky and very plastic; common very fine roots; many very fine tubular pores and common very fine interstitial pores; common intersecting slickensides; strongly effervescent with lime disseminated and in soft masses; moderately alkaline; gradual wavy boundary.

C1—24 to 35 inches; brown (10YR 5/3) silty clay, yellowish brown (10YR 5/4) when moist; common fine distinct white (10YR 8/1) lime mottles and dark gray (10YR 4/1) lime mottles; strong coarse angular blocky structure; extremely hard, firm, very sticky and very plastic; common very fine roots concentrated along peds; many very fine tubular pores and very few very fine interstitial pores; many intercepting slickensides; strongly effervescent with lime disseminated and in soft masses; moderately alkaline; gradual wavy boundary.

C2ca—35 to 45 inches; pale brown (10YR 6/3) silty clay, yellowish brown (10YR 5/6) when moist; many fine and large distinct white (10YR 8/1) lime mottles and few fine faint gray (10YR 4/1) lime mottles; moderate fine and medium subangular blocky structure; hard, friable, sticky and plastic; few very fine roots; many very fine tubular pores and few very fine interstitial pores; violently effervescent with lime disseminated and in soft masses; moderately alkaline; abrupt irregular boundary.

IIR—45 to 50 inches; calcareous sandstone.

The A1 horizon ranges from grayish brown to dark brown, and the texture is typically clay or silty clay. Reaction is mildly alkaline to moderately alkaline. When dry, the A horizon cracks to a depth of 24 inches.

The C horizon ranges from grayish brown to light yellowish brown, and textures are silty clay or clay. The depth to bedrock is typically 45 inches, but ranges from 40 to 60 inches.

AyD—Ayar silty clay, 5 to 15 percent slopes. This is a gently sloping to strongly sloping soil on hills. Slopes are mostly 9 percent.

Included with this soil in mapping were areas of Nacimiento, Alo, Diablo, Rincon, and Cropley soils. Also included were small areas of a clay soil that is similar to the Ayar soil, but is 20 to 40 inches deep to bedrock.

Runoff is medium, and the erosion hazard is moderate.

This soil is used mostly for dryland grain and range. Capability unit IIIe-5(15); Clayey range site.

AyE—Ayar silty clay, 15 to 30 percent slopes. This is a moderately steep soil on uplands. It has the profile described as representative of the series.

Included with this soil in mapping were small areas of Alo, Diablo, Linne, and Nacimiento soils. Also included were areas of Ayar silty clay, 5 to 15 percent

slopes, and areas of a clay soil that is similar to the Ayar soil, but is 20 to 40 inches deep to bedrock.

Runoff is rapid, and the erosion hazard is high.

This Ayar soil is used for dryland hay and grain and for range. Capability unit IVe-5(15); Clayey range site.

AyF—Ayar silty clay, 30 to 50 percent slopes. This is a steep soil on uplands. Slopes are mostly 40 percent.

Included with this soil in mapping were small areas of Nacimiento, Shedd, Alo, Linne, and Diablo soils. Also included were areas of a clay soil that is similar to the Ayar soil, but is 20 to 40 inches deep to bedrock.

The erosion hazard is high, and runoff is rapid.

This soil is used mostly for range. Capability unit VIe-1(15); Clayey range site.

Badland

Ba—Badland. This land type consists of gently sloping to very steep, severely eroded areas that are broken by many deeply entrenched drainage channels. Some Badland is severely eroded bluffs along the Salinas River and other major rivers, small severely eroded gullied areas, or escarpments. The elevation ranges from 200 to 3,000 feet. Much of this land type is barren, but if vegetation is present, it consists of sparse grasses, brush, and a few scattered scrub oaks.

This land type consists mostly of highly erodible, soft sediments that are covered with a thin mantle of relatively unstable soil in places. Reaction of the soil material and soft sediments ranges from medium acid to moderately alkaline and calcareous. Large amounts of silt and debris are deposited.

Included in mapping were small areas of Shedd, Gaviota, Nacimiento, Los Osos, Millsholm, San Andreas, Arnold, and Santa Ynez soils. Some small, narrow areas of Hanford, Gorgonio, Tujunga, and Metz soils and Psamments and Fluvents were included on alluvial plains or bottom lands in canyons. Also included were small areas of soils that have a dense cover of brush, areas that are not severely eroded, or some areas of sandstone and shale outcrop.

Runoff is very rapid, and the erosion hazard is very high. Drainage, subsoil permeability, depth of the root zone, and available water capacity all vary considerably within short distances.

This land type has little or no value for farming. It is used mostly for watershed. Some areas are used for wildlife habitat or recreation. There is a potential hazard of deposition onto adjacent lands. Capability unit VIIIe-1(15); range site not assigned.

Baywood Series

The Baywood series consists of somewhat excessively drained soils that formed in stabilized sand dunes. Slopes are 2 to 15 percent. The vegetation consists of manzanita, chamise, annual grasses, and scattered oaks. The elevation ranges from 50 to 250 feet. The mean annual precipitation is 12 to 18 inches, the mean annual air temperature is about 56° F, and the frost-free season is about 300 days. Summers are warm and foggy, and winters are cool and moist.

In a representative profile the surface layer is dark grayish brown and brown, slightly acid and medium acid sand 21 inches thick. Below this is pale brown, slightly acid sand 6 inches thick. It is underlain by very pale brown, slightly acid sand that extends to a depth of more than 60 inches.

Permeability is rapid, and the available water capacity is 2.5 to 3 inches. Roots penetrate to a depth of more than 60 inches.

Baywood soils are mostly the site for military training maneuvers at Fort Ord. They also have limited use for grazing and browsing wildlife.

Representative profile of Baywood sand, 2 to 15 percent slopes, about 1.75 miles SE from Marina on Fort Ord Military Reservation, 2,300 feet SW from junction of Reservation Road and paved road entering Fort Ord across from entrance to Fritzsbe Airfield; 900 feet west from junction of old country road and paved road across from Fritzsbe Airfield.

A11—0 to 5 inches; dark grayish brown (10YR 4/2) sand, very dark grayish brown (10YR 3/2) when moist; weak medium granular structure and coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; many very fine and fine roots; common very fine interstitial pores; slightly acid; clear wavy boundary.

A12—5 to 21 inches; brown (10YR 5/3) sand, dark brown (10YR 3/3) when moist; single grained; loose when dry or moist; many very fine and fine and few medium and coarse roots; few very fine interstitial pores; medium acid; clear wavy boundary.

AC—21 to 27 inches; pale brown (10YR 6/3) sand, dark yellowish brown (10YR 4/4) when moist; single grained; loose when dry or moist; common very fine and fine and few medium and coarse roots; few very fine interstitial pores; slightly acid; clear wavy boundary.

C1—27 to 38 inches; very pale brown (10YR 7/3) sand, brown (10YR 5/3) when moist; single grained; loose when dry or moist; common very fine and fine and few medium and coarse roots; slightly acid; diffuse wavy boundary.

C2—38 to 60 inches; very pale brown (10YR 7/4) sand, pale brown (10YR 6/3) when moist; single grained; loose when dry or moist; few medium and coarse roots; slightly acid.

The A horizon is 20 to 48 inches thick. The A1 horizon ranges from very dark grayish brown to brown, and texture is sand, fine sand, coarse sand, or loamy sand. Reaction ranges from medium acid to neutral.

The C horizon commonly is very pale brown, but ranges from brown to light gray and yellow. Texture is similar to the A1 horizon, but in some places is slightly more coarse. Reaction ranges from strongly acid to mildly alkaline. Thin bands of clay occur in the lower part of this horizon.

BbC—Baywood sand, 2 to 15 percent slopes. This is a gently sloping to rolling soil on stabilized sand dunes.

Included with this soil in mapping were areas of Oceano soils and Dune land. Also included were areas of soils that have a surface layer less than 20 inches thick, areas of moderately alkaline sands, and areas of Baywood soils that have slopes of less than 2 percent or more than 15 percent. Included near the city of Monterey were soils that have sandstone or Monterey shale at a depth of 30 to 60 inches.

Runoff is slow to medium, and the erosion hazard is slight to moderate.

This soil is located mostly on Fort Ord Military Reservation. It is also used for some grazing and browsing. If the vegetation cover is removed, the soil is subject to soil blowing and water erosion. Capability unit VIe-1(15); Sandy range site.

Chamise Series

The Chamise series consists of well drained soils that formed on high terraces in alluvium derived from shale. Slopes are 9 to 50 percent. The vegetation consists of annual grasses and scattered oaks. The elevation is 500 to 1,500 feet. The mean annual precipitation is 12 to 18 inches, the mean annual air temperature is 58° to 60° F, and the frost-free season is about 250 days. Summers are hot and dry, and winters cool and moist.

In a representative profile the surface layer is grayish brown, medium acid and strongly acid shaly loam about 18 inches thick. It is underlain by 1 inch of pale brown, very strongly acid shaly light clay loam. The subsoil is brown and dark brown, very strongly acid very shaly clay 21 inches thick. The substratum is light yellowish brown, very strongly acid shaly sandy loam that extends to a depth of more than 60 inches.

Permeability is moderately slow, and the available water capacity is 6 to 8 inches. The possible rooting depth is more than 60 inches, but few roots penetrate the subsoil.

Chamise soils are used mostly for range, but some areas of moderately sloping and strongly sloping soils are used for dryland grain and pasture.

Representative profile of Chamise shaly loam, 15 to 30 percent slopes, about 4 miles NW of King City; NW on Central Avenue 1,900 feet from U.S. Highway 101, then 2,800 feet SW on farm road along windbreak; about 1,400 feet NW along base of hills and 300 feet up hillside near a plant materials test plot in NE¼SE¼ sec 34, T. 19 S., R. 7 E.

A11—0 to 4 inches; grayish brown (10YR 5/2) shaly loam, very dark grayish brown (10YR 3/2) when moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and plastic; many very fine roots; common very fine tubular pores; medium acid; 25 percent shale fragments; gradual smooth boundary.

A12—4 to 18 inches; grayish brown (10YR 5/2) shaly loam, very dark grayish brown (10YR 3/2) when moist; moderate fine and medium subangular blocky and granular structure; slightly hard, friable, slightly sticky and plastic; common very fine roots; common very fine and medium tubular pores; strongly acid; 20 percent shale fragments; clear wavy boundary.

A2—18 to 19 inches, pale brown (10YR 6/3) shaly light clay loam, dark brown (10YR 3/3) when moist; moderate fine and medium subangular blocky and granular structure; slightly hard, friable, sticky and plastic; common very fine roots; common fine and very fine tubular pores and common very fine interstitial pores; very strongly acid; 20 percent shale fragments; clear wavy boundary.

B21t—19 to 29 inches; brown (10YR 5/3) very shaly light clay, dark brown (7.5YR 3/2) when moist; massive; hard, firm, sticky and plastic; few very fine roots; common very fine tubular pores; common moderately thick clay films lining pores; very strongly acid; 65 percent shale fragments; clear wavy boundary.

B22t—29 to 40 inches; dark brown (7.5YR 3/2) very shaly clay, dark brown (10YR 3/3) and dark reddish brown (5YR 3/2) when miost; massive; very hard, firm, very sticky and very plastic; few very fine roots; common very fine tubular pores; many moderately thick clay films in pores; very strongly acid; 55 percent coarse shale fragments; abrupt wavy boundary.

IIC—40 to 60 inches; light yellowish brown (10YR 6/4) shaly sandy loam, dark yellowish brown (10YR 4/4) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine interstitial pores; few thick clay films lining pores; very strongly acid; 15 percent shale fragments.

The A1 horizon is dark gray, gray, grayish brown, or dark grayish brown. Texture is commonly shaly loam, but ranges to shaly clay loam and shaly sandy loam in places. The content of angular fragments and cobblestones ranges from 15 to 25 percent. The horizon is 12 to 20 inches thick. Reaction ranges from strongly acid to neutral. There is a discontinuous A2 horizon 0 to 2 inches thick.

The B2t horizon ranges from dark brown to light yellowish brown. Texture is typically very shaly clay, but ranges to very shaly heavy clay loam. The content of angular gravel and cobblestone fragments ranges from 40 to 80 percent. The Bt horizon is commonly massive, but in places has angular blocky or weak prismatic structure. Reaction ranges from very strongly acid to medium acid.

The IIC horizon ranges from brown to light yellowish brown. Depth to weakly to strongly cemented alluvium is variable. There are generally no roots in the IIC horizon. Reaction ranges from very strongly acid to slightly acid. The content of angular gravel and cobblestone fragments ranges from 15 to 50 percent.

CaD—Chamise shaly loam, 9 to 15 percent slopes. This is a strongly sloping soil on terraces. Slopes are mostly 12 percent. In places the surface layer is gravelly sandy loam.

Included with this soil in mapping were areas of Lockwood, Rincon, Santa Lucia, Pinnacles, and Santa Ynez soils and Chamise shaly loam, 15 to 30 percent slopes. Also included were areas of strongly acid soils that have 5 to 30 percent coarse fragments in the subsoil and some areas of moderate rill and sheet erosion. Areas of Pinnacles soils that make up about 15 percent of the acreage and small areas of Santa Ynez, Lockwood, and Placentia soils are included north of Jolon.

Runoff is medium, and the erosion hazard is moderate.

This soil is used mostly for dryland grain and range. Capability unit IVe-1(15); Terrace range site.

CaE—Chamise shaly loam, 15 to 30 percent slopes. This is a moderately steep soil on high, dissected terraces. It has the profile described as representative of the series. Slopes are mostly 22 percent.

Included with this soil in mapping were small areas of Lockwood, Santa Lucia, Pinnacles, Linne, Santa Ynez, Shedd, Gazos, and Rincon soils. Also included were areas that have a slightly acid to neutral surface layer and subsoil and some areas where sheet and rill erosion is moderate. Areas of Pinnacles soils that make up about 10 percent of this mapping unit and small areas of Los Osos, Gazos, Santa Lucia, Alo, and Nacimiento soils were included north of Jolon. Areas of medium acid to neutral soils are included near San Ardo and south of Bradley.

Runoff is rapid, and the erosion hazard is high. Small landslips occur throughout this unit.

This Chamise soil is used mainly for range, but small areas are used for dryland grain. Capability unit IVe-1(15); Terrace range site.

CaF—Chamise shaly loam, 30 to 50 percent slopes. This is a steep soil on old dissected terraces. It has a profile similar to the one described as representative of the series, but depth to the substratum is 25 to 40 inches. Slopes are mostly 45 percent.

Included with this soil in mapping were small areas of Santa Lucia, Nacimiento, Gazos, Los Osos, and San

Benito soils. Also included were strongly acid soils that have 5 to 30 percent coarse fragments in the subsoil and some areas where rill and sheet erosion is moderate.

Runoff is rapid, and the erosion hazard is high. Small landslips occur throughout this unit.

This soil is used mostly for range. Capability unit VIe–1 (15); Terrace range site.

Chualar Series

The Chualar series consists of well drained soils that formed in alluvium derived from granitic and schistose rocks on alluvial fans and terraces. Slopes are 0 to 9 percent. The vegetation consists of annual grasses, forbs, and a few scattered oaks. The elevation is 50 to 2,000 feet. The mean annual precipitation is 12 to 25 inches, the mean annual air temperature is 57° to 60° F, and the frost-free season is about 250 days. Summers are warm and dry, except in the northern Salinas Valley where they are foggy, and winters are cool and moist.

In a representative profile the surface layer is dark grayish brown, mildly alkaline loam and sandy loam about 21 inches thick. The subsoil extends to a depth of 59 inches. The upper 34 inches is yellowish brown and brown, neutral to moderately alkaline sandy loam, sandy clay loam, and fine gravelly sandy loam. The lower 4 inches is brown, neutral fine gravelly coarse sandy loam. The substratum is brown, neutral gravelly coarse sand that extends to a depth of at least 80 inches.

Permeability is moderately slow, and the available water capacity is 7.5 to 9 inches. Roots penetrate to a depth of more than 60 inches.

Chualar soils are used mostly for irrigated row and field crops. They are also used for irrigated pasture, dryland grain, or range.

Representative profile of Chualar loam, 0 to 2 percent slopes, about 1 mile NE of Chualar, 0.45 mile SW on Chualar Road from Old Stage Road, on north side of road, 830 feet NW on dirt road, then 20 feet NE into field.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) when moist; weak medium granular and subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine roots; many very fine interstitial pores; mildly alkaline; clear smooth boundary.

A12—7 to 21 inches; dark grayish brown (10YR 4/2) heavy sandy loam, very dark grayish brown (10YR 3/2) when moist; moderate medium and coarse granular structure; hard, friable, slightly sticky and slightly plastic; few very fine roots; many very fine interstitial pores; mildly alkaline; clear wavy boundary.

B1t—21 to 30 inches; yellowish brown (10YR 5/4) heavy sandy loam, dark brown (10YR 3/3) when moist; massive; hard, friable, sticky and plastic; few very fine roots; many very fine interstitial pores and common very fine and few fine tubular pores; common thin clay films bridging grains and lining pores; moderately alkaline; many krotovinas; clear smooth boundary.

B21t—30 to 44 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 3/2) when moist; weak coarse angular blocky structure; very hard, firm, very sticky and plastic; no roots observed; common very fine interstitial pores; continuous thin clay films bridging grains, lining pores, and on ped faces; mildly alkaline; diffuse smooth boundary.

B22t—44 to 55 inches; brown (7.5YR 5/4) fine gravelly heavy sandy loam, dark brown (7.5YR 3/2) when moist; massive; very hard, firm, very sticky and plastic; common very fine interstitial pores and few very fine tubular pores; continuous thin clay films lining pores and a few moderately thick clay films bridging grains; 20 percent angular gravel; neutral; clear smooth boundary.

B3—55 to 59 inches; brown (7.5YR 5/4) fine gravelly coarse sandy loam, dark brown (7.5YR 4/4) when moist; massive; slightly hard, friable, slightly sticky and slightly plastic; many very fine interstitial pores; few thin clay films bridging grains; 30 percent angular gravel; neutral; abrupt smooth boundary.

C—59 to 80 inches; brown (7.5YR 5/4) fine gravelly coarse sand, dark brown (7.5YR 4/4) when moist; single grained; loose when dry or moist; many fine interstitial pores; 25 percent angular gravel; neutral.

The Ap and A12 horizons are very dark grayish brown to dark brown or brown. Texture is typically sandy loam but ranges to fine gravelly loam, coarse sandy loam, loam, silt loam, or light clay loam. Coarse fragments, commonly angular quartz or feldspar grains, make up 2 to 15 percent of the A horizon. Consistence is slightly hard or hard. Reaction is slightly acid to moderately alkaline. The more alkaline reactions result from excessive fertilization. The horizon is 9 to 40 inches thick. The A3 horizon, when present, is 8 to 12 inches thick.

The B2t horizon is dark brown, brown, dark yellowish brown, or light brown. Texture is heavy sandy loam, heavy loam, clay loam or sandy clay loam. The B2t horizon averages less than 35 percent coarse fragments. Reaction ranges from slightly acid to moderately alkaline. The B1t horizon, where present, is 8 to 12 inches thick.

The C horizon ranges from grayish brown to reddish yellow, and texture ranges from gravelly coarse sand to light sandy clay loam. Reaction ranges from neutral to moderately alkaline, and in some places this horizon is calcareous. The content of coarse fragments ranges from 20 to 40 percent. In some areas, gravel, cobblestones, or clay deposits are at a depth below 40 inches.

CbA—Chualar loam, 0 to 2 percent slopes. This soil is on alluvial fans and terraces. It has the profile described as representative of the series. In places the surface layer is sandy loam.

Included with this soil in mapping were areas that have slopes of more than 2 percent, and areas of Danville, Arroyo Seco, Elder, Gloria, and Placentia soils. Also included were soils that have a subsoil of sandy loam or loam that is less than 18 percent clay and some soils that have a hard, massive, dense layer at a depth of 30 to 48 inches. Small areas of Elder soils were included in the vicinity of Arroyo Seco and Clark Road.

Runoff is very slow, and the erosion hazard is minimal to slight.

This soil is used mostly for irrigated row crops, field crops, vineyards, and pasture. It is also used for dry-farmed grain or native range. Capability units I (14), IIIc–1 (15); range site not assigned.

CbB—Chualar loam, 2 to 5 percent slopes. This is a gently sloping soil on fans and terraces. The surface layer is loam or, in places, very fine gravelly loam, and it is 16 to 24 inches thick. The subsoil is 10 to 20 inches thick and ranges from slightly acid to mildly alkaline.

Included with this soil in mapping were small areas of Arroyo Seco, Elder, Gloria, Placentia, and Chamise soils and Chualar soils that have slopes of 0 to 2 percent and 5 to 9 percent. Included along the Arroyo Seco were some areas of this soil that are underlain by granite and shale cobblestones commonly at a depth

of more than 40 inches. Included along some of the valleys in the Hunter Liggett Military Reservation were areas of Chualar soils that are underlain by shale, sandstone, granite, or schist at a depth of 3 to 5 feet. Also included in the same area were soils on low knolls that have a surface layer of pale brown sandy loam and are 20 to 24 inches deep to bedrock.

Runoff is slow, and the erosion hazard is slight.

This soil is used mostly for irrigated row and field crops and dryland grain. Some areas are used for range. Capability unit IIe–1(14); range site not assigned.

CbC—Chualar loam, 5 to 9 percent slopes. This is a moderately sloping soil on fans and some terraces. It has a profile similar to the one described as representative of the series, but the surface layer is loam to light sandy clay loam that is commonly 10 to 20 inches thick and ranges from 9 to 40 inches. The subsoil is generally 20 to 36 inches thick, but ranges from 5 to 36 inches. The substratum varies considerably over short distances; and below a depth of 40 inches this soil, in places, is underlain by gravel, cobblestones, or clay deposits. Slopes are mostly 9 percent.

Included with this soil in mapping were small areas of Arroyo Seco, Nacimiento, San Benito, Los Osos, Gloria, Vista, Placentia, and Tujunga soils, Badland, Xerorthents, dissected, and Xerorthents, sandy. Also included were some small areas that have a strongly acid or medium acid subsoil and substratum, some areas near Arroyo Seco and River Road where the surface layer is massive and hard, and some areas that have slopes of less than 5 percent or of 9 to 15 percent. Some areas of rill and sheet erosion and a few gullies were also included.

Runoff is medium, and the erosion hazard is moderate.

This soil is used mostly for dryland grain and range. As irrigation water is developed, more of this soil is used for irrigated row and field crops. Capability unit IIe–1(14); range site not assigned.

Cieneba Series

The Cieneba series consists of excessively drained soils on mountains. These soils formed in material underlain by granitic and schistose rocks. Slopes are 30 to 75 percent. The vegetation consists of chamise, buckbrush, and manzanita; scattered scrub oaks, digger pine, and yucca; and some grass. Most areas are in chamise. The elevation is 1,000 to 5,000 feet. The mean annual air temperature is 60° to 65° F, and the annual precipitation is 16 to 25 inches. The frost-free season is about 200 days. Summers are hot and dry, and winters are cool and moist.

In a representative profile the surface layer is brown, slightly acid or neutral fine gravelly sandy loam. It is underlain by weathered granite at a depth of about 11 inches.

Permeability is moderately rapid, and the available water capacity is 1 to 2 inches. Roots penetrate to a depth of 7 to 18 inches.

Cieneba soils are used mostly for watershed and wildlife habitat.

Representative profile of Cieneba fine gravelly sandy loam, 30 to 75 percent slopes, about 9 miles east of Old Stage Road on Chualar Canyon Road, on a ridge on the north side of the road 20 feet from the edge of the road cut, in SE corner NE¼SE¼ sec. 14, T. 14 S., R. 5 E.

O1—½ inch to 0, intermittent, partly decomposed brush stems and leaves, grass, and twig litter.

A11—0 to 2 inches; brown (10YR 4/3) fine gravelly sandy loam, dark brown (10YR 3/3) when moist; moderate medium and fine granular structure; slightly hard, very friable, nonsticky and nonplastic; many very fine and few medium roots; common very fine and fine tubular and interstitial pores; 20 percent pebbles; slightly acid; clear smooth boundary.

A12—2 to 11 inches; brown (10YR 4/3) fine gravelly sandy loam, dark brown (10YR 3/3 and 7.5YR 3/2) when moist; weak medium and coarse subangular blocky structure that parts to moderate medium and fine granular; slightly hard, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; few fine tubular and common fine and medium interstitial pores; 25 percent pebbles; neutral; clear irregular boundary.

Cr—11 to 60 inches; very pale brown and yellowish brown (10YR 7/4 and 5/4) weathered granite; rock structure; larger roots penetrate fractures.

The soil is very micaceous throughout. The A1 horizon is dark grayish brown, grayish brown, brown, light brownish gray, pale brown, or light yellowish brown. Texture is coarse sandy loam, gravelly sandy loam, or gravelly light loam. When dry, consistence is soft or slightly hard. Reaction ranges from medium acid to mildly alkaline. Depth to weathered bedrock ranges from 7 to 18 inches. In some areas, 5 to 25 percent of the surface is covered by stone or is rock outcrop.

CcG—Cieneba fine gravelly sandy loam, 30 to 75 percent slopes. This is a steep and very steep soil on mountainsides that have mainly southern exposures. The elevation is 1,000 to 4,000 feet. This soil has the profile described as representative of the series.

Included with this soil in mapping were Cieneba soils that have slopes of more than 75 percent and that make up about 10 percent of the acreage; small areas of Sheridan, Gilroy, and Vista soils; and areas of soils, on the lower part of hillsides, that have a sandy clay loam subsoil and are more than 20 inches deep. Also included were soils that have slopes of more than 50 percent and are underlain by rock at a depth of less than 20 inches. They make up about 15 percent of the inland acreage, and about half of the acreage near the coast. Stony soils that have a surface layer of very dark grayish brown or very dark brown sandy loam or loam and that are more than 20 inches deep to bedrock make up about 10 percent of the acreage, and soils that have a surface layer of pale brown sandy loam and are less than 10 inches deep make up 5 percent. Small areas of Rock outcrop-Xerorthents were also included.

Runoff is very rapid, and the erosion hazard is very high.

This Cieneba soil is used for watershed and wildlife habitat. A few areas are used for range. Capability unit VIIe–1(15); Shallow Loamy range site.

Cd—Cieneba-Rock outcrop complex. This mapping unit is on mountains in the Los Padres National Forest and the Ventana Wilderness. The exposure is to the south, and the elevation is 1,500 to 5,000 feet. The Cieneba soils formed in material that was derived from granitic rocks. Slopes are 50 to 75 percent. Rock outcrop consists of granite boulders, stones, or outcrops covering areas of 1 to 5 acres. The soil and rock out-

crop were so intermingled that it was not feasible to map them separately at the scale used.

Cieneba soils make up about 50 percent of this complex and Rock outcrop 15 to 25 percent. The rest consists of areas of brown, grayish brown, or pale brown sandy loams or loamy sands that have 35 to 70 percent coarse fragments. Included are areas of Sur, Sheridan, Pfeiffer, and Junipero soils. Cieneba soils in areas above 4,000 feet are colder than is representative of the Cieneba series.

Runoff is very rapid, and the erosion hazard is high.

This complex is used for watershed, wildlife habitat, and some grazing. Capability unit VIIs-1 (15) ; Shallow Loamy range site.

Ce—Cieneba-Sur-Rock outcrop complex. The soils in this mapping unit formed in material that was derived from granitic rocks, schist, and gneiss in mountainous areas of the Los Padres National Forest and the Ventana Wilderness. Exposure is to the south, and the elevation is 2,600 to 4,700 feet. Slopes are 50 to 85 percent. Rock outcrop consists of granite, schist, or gneiss outcrops, boulders, or stones. It covers areas 1 to 5 acres in size. The soils and rock outcrop were so intermingled that it was not feasible to map them separately at the scale used.

Cieneba soils make up about 40 percent of this complex, Sur soils 25 percent, and Rock outcrop 15 to 20 percent. The rest consists of Sheridan and Junipero soils and similar soils that have more than 35 percent coarse fragments. Areas of colluvium are included.

Runoff is very rapid, and the erosion hazard is very high.

This complex is used for watershed, recreation, and wildlife habitat. Most areas are inaccessible and can be reached only by foot trail or on horseback. Capability unit VIIIs-1 (15) ; range site not assigned.

Clear Lake Series

The Clear Lake series consists of poorly drained soils that formed on flood plains or in basins in alluvium derived from sedimentary rocks. Slopes are less than 1 percent. The vegetation consists of annual grasses, sedges, and tules. The elevation is commonly less than 150 feet, but ranges from 10 to 1,300 feet. The mean annual precipitation is 12 to 25 inches, the mean annual air temperature is about 57° F, and the frost-free season is about 270 days. Summers are warm and dry and are often foggy, and winters are cool and moist.

In a representative profile the surface layer is very dark gray and dark gray, moderately alkaline clay about 24 inches thick. Below this is grayish brown and light brownish gray, calcareous heavy silty clay loam and heavy silt loam 30 inches thick. It is underlain by pale olive, calcareous loamy very fine sand to a depth of more than 60 inches.

Permeability is slow. The water table is at a depth of 18 to 36 inches unless the soil is drained.

Clear Lake soils are used mostly for irrigated row and field crops.

Representative profile of Clear Lake clay, moderately wet, about 2 miles west of Salinas; 4,900 feet NW on Blanco Road from the intersection of Blanco and Davis Roads, then 1,900 feet NE from Blanco Road. The site is 200 feet NW from the NE corner of the field, then 45 feet SW.

A11—0 to 18 inches; very dark gray (N 3/0) clay, black (10YR 2/1) when moist; strong very coarse prismatic structure, surface 1 inch has strong medium granular structure; extremely hard, very firm, sticky and very plastic; common very fine and fine exped roots and few very fine and fine inped roots; few very fine tubular pores; moderately alkaline; gradual smooth boundary.

A12—18 to 24 inches; mixed very dark gray and dark gray (N 3/0, 10YR 4/1, 5Y 4/1) clay, very dark gray and very dark grayish brown (10YR 3/1, 2.5Y 3/2) when moist; moderate medium angular blocky structure; very hard, firm, sticky and very plastic; few fine roots; common very fine tubular pores; common intersecting slickensides; moderately alkaline; clear wavy boundary.

C1—24 to 33 inches; grayish brown (2.5Y 5/2) heavy silty clay loam, very dark grayish brown (2.5Y 3/2) when moist; weak coarse angular blocky structure; very hard, firm, sticky and plastic; very few very fine roots; many very fine tubular pores; common intersecting slickensides; very slightly effervescent with disseminated lime; moderately alkaline; clear smooth boundary.

C2—33 to 54 inches; light brownish gray (2.5Y 6/2) heavy silt loam, dark grayish brown (2.5Y 4/2) when moist; massive; very hard, friable, very sticky and plastic; very few very fine roots; many very fine tubular pores; slightly effervescent with disseminated lime; moderately alkaline; gradual smooth boundary.

IIC3—54 to 62 inches; pale olive (5Y 6/3) loamy very fine sand, olive (5Y 5/4) when moist; massive; hard, friable, nonsticky and nonplastic; no roots observed; very few very fine tubular pores; slightly effervescent with disseminated lime; moderately alkaline.

The A1 horizon is black, very dark gray, or dark gray, and texture is commonly clay or silty clay. Reaction ranges from slightly acid to moderately alkaline. Lime is in the lower part of the A horizon in some places. Cracks ⅛ inch to more than 1 inch wide extend to a depth of 20 to 36 inches. Unless irrigated, the cracks remain open all during summer and until the rains in fall. There are few to common intersecting slickensides at a depth of 12 to 36 inches. In some places there is an AC horizon that has mixed colors of the A and C horizons and is as much as 12 inches thick.

The C horizon ranges from dark grayish brown to pale olive, and the darker colors are typically in the upper part. At a depth of 40 inches texture is clay, silty clay, clay loam, silt loam, or silty clay loam, that averages more than 30 percent clay. The horizon is mildly alkaline to moderately alkaline and calcareous. The lower part is stratified and noncalcareous in some places. In some places a very dark gray to dark grayish brown buried soil is at a depth of 48 to 60 inches.

In Monterey County some Clear Lake soils are not so dark to a depth of 40 inches as is defined in the range for the series.

Cf—Clear Lake clay. This is a nearly level soil on flood plains or in basins. It has a profile similar to the one described as representative of the series, but depth to the water table is 18 to 36 inches.

Included with this soil in mapping were areas of Clear Lake clay, moderately wet, which make up 10 percent of the acreage, and small areas of Cropley, Pacheco, and Salinas soils. Also included were some areas of very dark grayish brown or dark grayish brown clay; areas along Carneros Creek and other drainageways where peat and muck occur between depths of 20 and 48 inches; and areas that have stratified clay, clay loam, and muck. Some areas that have mottles within 36 inches of the surface and a wa-

ter table at a depth of 48 to 60 inches were also included.

Runoff is very slow, and there is no erosion hazard. Roots can generally penetrate to a depth of 60 inches or more, but some can penetrate only to a depth of 18 to 36 inches because of the water table. The available water capacity is 6 to 9 inches. Flooding occurs 3 or 4 times in 7 out of 10 years and has a duration of as many as 14 to 40 days, mostly in the Carr Lake and Merritt Lake areas. If drained, this soil reacts like Clear Lake clay, moderately wet.

This soil is used mostly for irrigated row crops, principally celery, artichokes, and lettuce. Capability unit IIIw-5(14); range site not assigned.

Cg—Clear Lake clay, moderately wet. This is a nearly level soil on flood plains and in basins. It has the profile described as representative of the series.

Included with this soil in mapping were areas of Clear Lake clay that has a water table at a depth of 18 to 36 inches, which make up about 10 percent of the mapping unit, and areas of Pacheco, Mocho, Salinas, and Cropley soils. Also included were areas of very dark grayish brown, dark grayish brown, or grayish brown clays or silty clays, which make up as much as 200 acres. In areas on the south edge of Salinas near Abbott Street and Harkins Road, this Clear Lake soil is underlain by Antioch soils at a depth of about 24 to 48 inches. This is common where the terrace soils grade into the basins or flood plains. In some of these areas the soil has mottles but no water table. In areas north of Blanco Road from Armstrong Road west past Cooper Road the surface layer is nearly olive gray. In some areas it is clay, typically 18 to 24 inches thick, abruptly overlying a substratum of silt loam to very fine sand. Near Espinosa Road and the Castroville-Salinas Highway, areas of this soil are underlain by clay, silty clay, silty clay loam, or muck at a depth of 15 to 24 inches and areas of other soils have an organic surface layer. The water table in this vicinity is about 30 to 60 inches from the surface. In 6 to 10 percent of the acreage the water table is at a depth of 36 to 60 inches but there are no mottles, or common to many medium distinct to prominent mottles but no water table.

Runoff is very slow, and there is no erosion hazard. Roots can penetrate to a depth of more than 60 inches, and the available water capacity is 8 to 10 inches. During periods of long and above-normal rainfall, this soil can be flooded for periods of 2 to 14 days a year in 7 out of 10 years, particularly in the areas of Carr Lake and Merritt Lake. This soil is presently partly drained, but was poorly drained when it formed. The water table has been lowered by open drainage ditches and tile drains, by deepening drainage channels, and by pumping.

This soil is used mostly for intensively irrigated row crops, principally celery, lettuce, broccoli, and cauliflower. Near Aromas a few apple orchards have been established. In some areas west of Salinas small amounts of salts are accumulating near the surface. Capability unit IIw-5(14); range site not assigned.

Climara Series

The Climara series consists of well drained soils on uplands. These soils formed in material underlain by hard, greenish gray serpentine. Slopes are 15 to 50 percent. The vegetation consists of annual grasses and forbs and a few scattered pines, chamise, and California junipers. The elevation is 500 to 3,000 feet. The mean annual precipitation is 10 to 25 inches, the mean annual air temperature is 58° to 60° F, and the frost-free season is about 150 days. Summers are hot and dry, and winters are cool and moist.

In a representative profile the surface layer is dark gray, mildly alkaline to moderately alkaline clay about 21 inches thick. It is underlain by olive gray calcareous clay. Greenish gray serpentine is at a depth of 40 inches.

Permeability is slow, and the available water capacity is 4.5 to 7 inches. Roots penetrate to a depth of 30 to 40 inches.

Climara soils are used mostly for range.

Representative profile of Climara clay, 30 to 50 percent slopes, about 4,700 feet SE of Catfish Lake in SE¼NW¼ sec. 2, T. 23 S., R. 14 E.

A11—0 to 11 inches; dark gray (5Y 4/1) light clay, very dark gray (5Y 3/1) when moist; strong medium and coarse angular blocky structure; very hard, friable, very sticky and very plastic; common very fine roots; common very fine tubular pores; mildly alkaline; gradual smooth boundary.

A12—11 to 21 inches; dark gray (5Y 4/1) clay, very dark gray (5Y 3/1) when moist; strong medium and coarse angular and subangular blocky structure and weak coarse prismatic structure; very hard, firm, very sticky and very plastic; common very fine and few medium roots; common very fine tubular pores; many small and medium intersecting slickensides; very slightly effervescent with lime in soft masses; moderately alkaline; gradual smooth boundary.

Cca—21 to 40 inches; olive gray (5Y 5/2) clay, dark olive gray (5Y 3/2) when moist; areas of gray and brown (5Y 5/1 and 7.5YR 5/4), very dark gray and brown (5Y 5/1 and 7.5YR 4/4) when moist; weak coarse and very coarse angular blocky structure; very hard, firm, very sticky and very plastic; few very fine and medium roots; common very fine tubular pores; strongly effervescent with lime disseminated and in soft filaments; moderately alkaline; abrupt smooth boundary.

IIR—40 to 46 inches; greenish gray serpentine.

The A1 horizon is dark gray or gray, and texture is clay or heavy clay loam. Reaction ranges from neutral to moderately alkaline. When dry, these soils crack from the surface to a depth of about 33 inches.

The Cca horizon is dark gray, gray, and olive gray, and texture is light clay or clay. Depth to lime commonly is 11 inches, and depth to bedrock ranges from 30 to 40 inches. In some places 10 to 15 percent fine angular gravel and some cobblestones are throughout the soil.

ChE—Climara clay, 15 to 30 percent slopes. This is a moderately steep soil on uplands. Slopes are mostly 25 percent.

Included with this soil in mapping were areas of Diablo and Gilroy soils, Rock outcrop-Xerorthents, Xererts-Xerolls complex, and Climara clay, 30 to 50 percent slopes. Also included were areas where sheet and rill erosion is moderate and wet spots.

Runoff is rapid, and the erosion hazard is moderate.

This soil is used mostly for range. Capability unit IVe-5(15); Clayey range site.

ChF—Climara clay, 30 to 50 percent slopes. This is a steep soil on uplands. It has the profile described as representative of the series. Slopes are mostly 40 percent.

Included with this soil in mapping were small areas of Montara, Millsholm, Gilroy, and Alo soils, Climara clay, 15 to 30 percent slopes, Rock outcrop-Xerorthents association, and Xererts-Xerolls complex. Also included were areas of clays that are similar to this Climara clay, but are calcareous throughout or are 40 to more than 60 inches deep to bedrock, and small areas of moderate sheet and rill erosion.

Runoff is rapid, and the erosion hazard is high.

This Climara soil is used for range. Small landslips, landslides, seeps, and springs are common on this soil. Capability unit VIe–1(15) ; Clayey range site.

Ck—Climara-Montara complex. The soils in this complex are steep to very steep. They formed on uplands in material that was derived from serpentine. Slopes are 30 to 75 percent. The Climara soil has slopes of 30 to 50 percent, and the Montara soil has slopes of 30 to 75 percent.

Climara soils make up 45 percent of this complex and Montara soils 20 percent. The rest consists of Gilroy, Millsholm, Alo, Nacimiento, and Diablo soils, Rock outcrop-Xerorthents association, Badland, severely eroded areas, and Xererts-Xerolls complex. These soils were so intermingled or so small in extent that it was not feasible to map them separately at the scale used.

Runoff is rapid, and the erosion hazard is high or very high.

This complex is used for range, watershed, and wildlife habitat. The soils have many landslips or landslides and are very unstable. Capability unit VIIe–1(15); Climara soil in Clayey range site, Montara soil in Serpentine range site.

Coastal Beaches

Cm—Coastal beaches. This land type is on narrow, sandy beaches and adjacent sand dunes. It is partly covered by water during high tides and is exposed during low tides. The beaches can consist of all sand, all gravel, all cobbles, or all boulders, or a mixture of any of these. There are no beaches in some areas where very steep escarpments or uplands rise abruptly from the water. This land type is mostly barren.

Included in mapping were areas of Dune land, Rock outcrop-Xerorthents association, and Psamments and Fluvents, frequently flooded.

Drainage is excessive to very poor. Permeability is very rapid, and the available water capacity is 2 or 3 inches. Runoff is slow, but the erosion hazard is very high because of wind and wave action. Depth of the root zone is variable, but where the beaches are mostly sand, roots can penetrate to a depth of 60 inches or more.

This land type is used mainly for recreation. It has no value for farming. Capability unit VIIIw–1 (15) ; range site not assigned.

Cropley Series

The Cropley series consists of well drained soils on terraces, alluvial fans, flood plains, and in small basins. These soils formed in alluvium derived from sedimentary rocks. Slopes are 0 to 9 percent. The vegetation consists of annual grasses and forbs. The elevation is generally 50 to 1,500 feet, but ranges to 2,800 feet in Priest Valley. The mean annual precipitation is 12 to 18 inches, the mean annual air temperature is 57° to 60° F, and the frost-free season is about 250 days, but in Priest Valley is only about 140 days. Summers are warm and dry, except in the northern Salinas Valley where they are often foggy, and winters are cool and moist.

In a representative profile the surface layer is very dark gray, moderately alkaline silty clay about 36 inches thick. Below this is dark gray and yellowish brown, moderately alkaline calcareous silty clay 10 inches thick. The underlying material is pale brown, very pale brown and light gray, moderately alkaline, calcareous silty clay and silty clay loam to a depth of more than 76 inches.

Permeability is slow, and the available water capacity is 8 to 10 inches. Roots penetrate to a depth of more than 60 inches. This soil has a high shrink-swell limitation that causes severe hazards for building sites, roads, and structures (fig. 2).

Cropley soils are used mostly for irrigated row crops. Some are used for dryland grain or annual pasture.

Figure 2.—**Cropley silty clay after the soil has dried and maximum shrinkage has occurred. Cracks extend to a depth of about 4 feet. This soil has a high shrink-swell limitation that causes severe hazards for building sites, roads, and structures.**

Representative profile of Cropley silty clay, 0 to 2 percent slopes, about 5.5 miles SE of downtown Salinas on U.S. Highway 101. From the left turn on Hartnell Road off U.S. Highway 101, going south, the site is 1,000 feet NW from the intersection to the SW corner of field, then 190 feet NE and 100 feet NW.

A11—0 to 4 inches; very dark gray (10YR 3/1, dry and moist) silty clay; strong medium and coarse granular structure; hard, firm, sticky and very plastic; many very fine roots; common very fine tubular pores; moderately alkaline; clear smooth boundary.

A12—4 to 25 inches; very dark gray (10YR 3/1, dry and moist) heavy silty clay; strong very coarse angular blocky structure; extremely hard, very firm, sticky and very plastic; common very fine roots; common very fine tubular pores; moderately alkaline; slickensides beginning at a depth of about 6 inches and increasing in number with depth to 69 inches; large prisms 12 to 18 inches wide and 20 to 24 inches long extend through this horizon to a depth of about 4 feet; gradual wavy boundary.

A13—25 to 36 inches; very dark gray (10YR 3/1, dry and moist) heavy silty clay; strong very coarse angular blocky structure; extremely hard, very firm, sticky and very plastic; common very fine exped roots; common very fine tubular pores; slightly calcareous, fine segregated lime is in soft masses; moderately alkaline; common slickensides; vertical cracks extend through this horizon; clear wavy boundary.

ACca—36 to 46 inches; mixed dark gray (10YR 4/1) and yellowish brown (10YR 5/4) silty clay, very dark gray (10YR 3/1) and dark yellowish brown (10YR 4/4) when moist; strong coarse angular blocky structure; very hard, firm, sticky and plastic; common very fine exped roots; common very fine tubular pores; very strongly calcareous, large segregated lime is in seams and in soft masses; moderately alkaline; many slickensides; vertical cracks extend through this horizon; gradual wavy boundary.

C1ca—46 to 55 inches; pale brown (10YR 6/3) silty clay, dark yellowish brown (10YR 4/4) when moist; dark gray and very dark gray (10YR 4/1 and 3/1) coatings of soil from overlying horizons along vertical cracks; strong coarse angular blocky structure; very hard, firm, sticky and plastic; common very fine exped roots; many very fine tubular pores; very strongly calcareous, with segregated lime in large seams and in large soft masses; common slickensides; many prominent black stains and concretions (1 to 2 mm); gradual wavy boundary.

C2—55 to 69 inches; very pale brown (10YR 7/4) silty clay, yellowish brown and dark yellowish brown (10YR 5/4 and 4/4) when moist; strong coarse and medium angular blocky structure; very hard, firm, sticky and plastic; common very fine exped roots; many very fine tubular pores; strongly calcareous, with disseminated lime in medium seams and in medium soft masses; moderately alkaline; few pressure faces; many prominent black stains and concretions (1 to 2 mm); clear wavy boundary.

C3—69 to 76 inches; light gray (10YR 7/2) silty clay loam, mixed yellowish brown and light yellowish brown (10YR 5/4 and 6/4) when moist; moderate coarse and medium angular blocky structure; very hard, firm, sticky and plastic; few very fine roots; many very fine tubular pores; slightly calcareous, disseminated lime in small soft masses; moderately alkaline; few indistinct pressure faces.

The A1 horizon is dark gray or very dark gray, and texture is silty clay, heavy silty clay loam, heavy clay loam, or clay. Reaction ranges from neutral to moderately alkaline. Intersecting slickensides typically begin at a depth of 6 inches and continue to a depth of about 60 inches. Slickensides may be difficult to observe where irrigation and continued cropping have occurred. If not irrigated, the soils crack to a depth of about 48 inches. In some places 5 to 20 percent gravel is below a depth of 20 inches.

The AC or ACca horizon is mixed very dark gray, dark gray, and grayish brown to light olive brown. Texture is silty clay, clay, heavy clay loam, or heavy silty clay loam. Reaction ranges from mildly alkaline to moderately alkaline and may be calcareous.

The Cca or C horizon ranges from grayish brown to very pale brown and light olive brown. Cracks that extend into the C horizon are filled with very dark gray or dark gray soil from the A or AC horizon. The lower C horizon ranges from very fine sandy loam to clay. Generally the C horizon is slightly calcareous to very strongly calcareous.

CnA—Cropley silty clay, 0 to 2 percent slopes. This soil is on alluvial fans, on flood plains, and in basins. It has the profile described as representative of the series.

Included with this soil in mapping were areas of Clear Lake, Mocho, Antioch, Salinas, and Sorrento soils and soils that are similar to this Cropley soil, but have a surface layer that is very dark grayish brown or dark grayish brown in the upper 12 inches or is slightly acid. Also included were some areas of soils that are similar to Cropley soils, but the surface layer is 18 to 24 inches thick and is abruptly underlain by pale brown or light olive brown material. Small included areas of somewhat poorly drained or moderately well drained soils are flooded briefly and intermittently for periods of 1 to 5 days a few times a year.

Runoff is slow, and the erosion hazard is minimal.

This soil is used mostly for irrigated row and field crops, especially celery and lettuce. Capability unit IIs–5(14); range site not assigned.

CnC—Cropley silty clay, 2 to 9 percent slopes. This is a sloping and moderately sloping soil on fans, terraces, or terrace breaks. Slopes are mostly 3 to 5 percent.

Included with this soil in mapping were areas of Diablo, Salinas, Antioch, Rincon, Sorrento, and Mocho soils. Also included were some areas of soils in which the surface layer is very dark grayish brown or dark grayish brown in the upper 12 inches.

Runoff is slow to medium, and the erosion hazard is slight to moderate.

This soil is used for irrigated crops, dryland grain, and hay and pasture. Capability units IIe–5(14), IIIe–5(15); range site not assigned.

Danville Series

The Danville series consists of well drained soils on alluvial fans and in small valleys. These soils formed in alluvium that was derived mainly from granitic and schistose rocks. Slopes are 0 to 9 percent. The vegetation consists of annual grasses and forbs. The elevation is 100 to 1,500 feet. The annual precipitation is 10 to 14 inches, the mean annual air temperature ranges from 58° to 63° F, and the frost-free season is about 250 days. Summers are warm and are often foggy in the northern Salinas Valley, and winters are cool and moist.

In a representative profile the surface layer is very dark grayish brown, mildly alkaline and moderately alkaline sandy clay loam and light sandy clay about 18 inches thick (fig. 3). The subsoil is 35 inches thick. It is very dark grayish brown, moderately alkaline clay and dark brown, moderately alkaline gravelly light

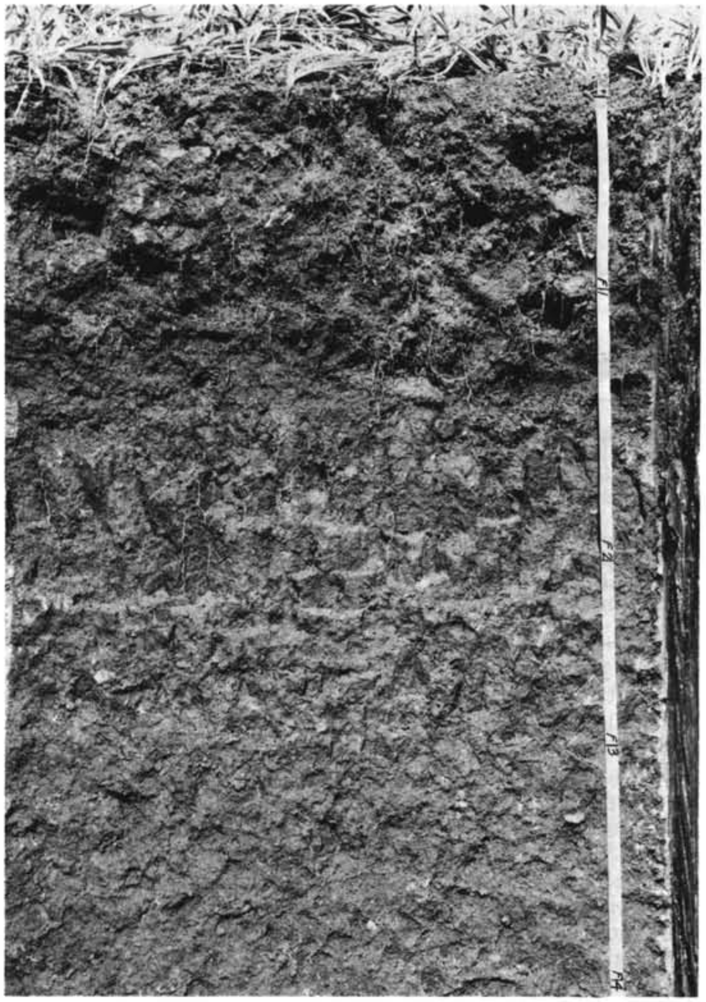

Figure 3.—**A typical profile of Danville sandy clay loam, 0 to 2 percent slopes. The clay subsoil is at a depth of 18 inches.**

sandy clay loam. The substratum is brown and strong brown, moderately alkaline gravelly sandy clay loam and clay loam that extends to a depth of more than 60 inches.

Permeability is slow, and the available water capacity is 8 to 10 inches. Roots penetrate to a depth of more than 60 inches.

Danville soils are used intensively for irrigated field, truck, and forage crops in most areas. Some areas are used for annual pasture, grain, and hay.

Representative profile of Danville sandy clay loam, 0 to 2 percent slopes, about 3 miles north of Gonzales, 2.2 miles NW on Iverson Road from the intersection with Johnson Canyon Road, 0.21 mile SW on road from Iverson Road and 30 yards north of crossroad.

Ap1—0 to 5 inches; very dark grayish brown (10YR 3/2) sandy clay loam, very dark brown (10YR 2/2) when moist; moderate medium and coarse subangular blocky structure; hard, friable, sticky and plastic; many very fine roots; common very fine tubular pores; mildly alkaline; clear wavy boundary.

Ap2—5 to 18 inches; very dark grayish brown (10YR 3/2) sandy clay loam, very dark brown (10YR 2/2) when moist; strong very coarse and weak medium and coarse subangular blocky structure; very hard, friable, sticky and plastic; many very fine exped roots; common very fine and few fine tubular pores; moderately alkaline; clear wavy boundary.

B2t—18 to 38 inches; very dark grayish brown (10YR 3/2) dry and moist) clay, dark brown (10YR 3/3) rubbed when moist; moderate medium and coarse prismatic and angular blocky structure; prisms have weakly developed rounded caps in the upper 3 inches of horizon; very hard, firm, sticky and very plastic; common very fine exped roots; many very fine tubular pores; continuous moderately thick clay films on faces of peds and lining pores, few thick clay films in pores; moderately alkaline; gradual wavy boundary.

B3t—38 to 53 inches; dark brown (10YR 3/3) gravelly light sandy clay loam, dark brown (7.5YR 3/2) when moist; massive; hard, friable, slightly sticky and slightly plastic; common very fine roots; many very fine and few fine tubular pores; many thin clay films lining pores and common thin clay films bridging mineral grains; 15 percent angular fine pebbles (2–10 millimeters); moderately alkaline; gradual wavy boundary.

C1—53 to 67 inches; brown (7.5YR 4/4) gravelly light sandy clay loam, dark brown (7.5YR 4/2) when moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine interstitial pores and many very fine and coarse tubular pores; few moderately thick clay films lining pores and bridging grains; 15 percent angular fine pebbles (2–10 millimeters); moderately alkaline; gradual wavy boundary.

C2—67 to 78 inches, mixed strong brown (7.5YR 5/6) and brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4 and 4/2) when moist; massive; hard, friable, sticky and plastic; very few fine roots; many very fine, common medium, and few fine tubular pores; few moderately thick clay films lining pores and bridging grains; slightly calcareous with lime segregated in seams; moderately alkaline.

The A horizon ranges from dark grayish brown to very dark brown, black, or dark gray. Texture is light sandy clay loam, heavy sandy clay loam, or light sandy clay that has up to 20 percent fine (2–10 millimeters) angular gravel in places. Reaction ranges from medium acid to moderately alkaline. Thickness is 12 to 24 inches. Structure is typically blocky, but is granular in the upper 3 or 4 inches in places.

The B2t horizon ranges from very dark grayish brown to brown. Texture is typically clay but ranges to heavy clay loam and contains up to 20 percent gravel in places. Reaction ranges from neutral to moderately alkaline.

The B3t horizon, or B3 horizon, and the C horizon range from very dark grayish brown to strong brown or brown. Textures are sandy clay loam, clay loam, or sandy loam. The B3 and C horizons contain 20 to 25 percent fine angular gravel in some places.

The C2 horizon is variable, with textures of clay loam, coarse sandy loam, sand, or fine gravel. It ranges from slightly acid to moderately alkaline and from noncalcareous to strongly calcareous below a depth of 40 inches.

DaA—Danville sandy clay loam, 0 to 2 percent slopes. This is a nearly level soil on alluvial fans and in valleys. It has the profile described as representative of the series.

Included with this soil in mapping were areas of a similar soil that has a very slowly permeable subsoil, a few areas that have an overwash of sandy loam or loam 5 to 20 inches deep, and some areas that have a subsoil that is less than 35 percent clay. Small areas of Placentia, Chualar, Arroyo Seco, McCoy, Cropley, Gorgonio, and Hanford soils were also included.

Runoff is slow, and the erosion hazard is slight.

This soil is used mostly for irrigated row, field, and forage crops. It is also used for annual pasture, grain,

and hay. Capability unit IIs–3(14); range site not assigned.

DaC—Danville sandy clay loam, 2 to 9 percent slopes. This is a gently sloping and moderately sloping soil on small fans adjacent to the foothills and along small, narrow valleys. It has a profile similar to the one described as representative of the series, but contains angular, slightly rounded cobbles or pebbles in places. Slopes are mostly 4 to 6 percent.

Included with this soil in mapping were small areas of Placentia, Chualar, Elder, Arroyo Seco, McCoy, Gorgonio, Hanford, and Cropley soils. Also included were areas that have an overwash of sandy loam to gravelly sand 5 to 15 inches thick or areas where the subsoil is sandy loam, loam, or gravelly light sandy clay loam. Some areas where weathered granite is at a depth of 36 to 60 inches and slopes are as steep as 15 percent were also included.

Runoff is slow and medium, and the erosion hazard is slight to moderate.

This soil is used for dryland grain, hay and pasture, and a few areas are used for irrigated crops. Capability unit IIe–3(14); range site not assigned.

Diablo Series

The Diablo series consists of well drained soils on uplands. These soils formed in material underlain by calcareous sandstone and shale. Slopes are 9 to 50 percent. The vegetation is annual grasses and forbs. The elevation is 40 to 2,000 feet. The mean annual precipitation is 10 to 16 inches, the mean annual air temperature is about 60° F, and the frost-free season is about 250 days. Summers are hot and dry, and winters are cool and moist.

In a representative profile the surface layer is very dark gray and dark gray, slightly acid and neutral clay about 30 inches thick. It is underlain by dark grayish brown and grayish brown, moderately alkaline clay. Calcareous shale is at a depth of 53 inches.

Permeability is slow, and the available water capacity is 7 to 12 inches. Roots penetrate to a depth of 40 to 60 inches.

Diablo soils are used mostly for range. A few areas are used for dryland grain. Some areas have small landslips.

Representative profile of Diablo clay, 15 to 30 percent slopes, near San Lucas; about 6 miles east on State Highway 198 and 0.8 mile north on farm road; in SE¼NE¼ sec 25, T. 20 S., R. 9 E.

A11—0 to 5 inches; very dark gray (10YR 3/1, dry and moist) clay, upper 1 inch is dark gray (5Y 4/1); moderate coarse angular blocky structure, surface ⅛ to ¼ inch is strong fine subangular blocky in 75 percent of area; extremely hard, firm, very sticky and very plastic; common very fine roots; common very fine interstitial pores and common very fine tubular pores; neutral; gradual smooth boundary.

A12—5 to 18 inches; very dark gray (10YR 3/1, dry and moist) clay; moderate coarse subangular blocky structure; very hard, firm, very sticky and very plastic; common very fine roots; common very fine interstitial pores and few very fine tubular pores; slightly acid; gradual smooth boundary.

A13—18 to 30 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) when moist; moderate coarse subangular blocky structure; very hard, firm, very sticky and very plastic; few very fine roots; few very fine interstitial pores and very few very fine tubular pores; neutral; distinct intersecting slickensides; gradual smooth boundary.

C1—30 to 39 inches; dark grayish brown (2.5Y 4/2) clay, very dark grayish brown (2.5Y 3/2) when moist; weak medium subangular blocky structure; very hard, firm, very sticky and very plastic; few very fine roots; very few very fine tubular pores and few very fine interstitial pores; moderately alkaline; common intersecting slickensides; gradual smooth boundary.

C2—39 to 53 inches; grayish brown (2.5Y 5/2) clay, very dark grayish brown (2.5Y 3/2) when moist; weak medium subangular blocky structure; very hard, firm, very sticky and very plastic; moderately alkaline; common lime nodules; abrupt wavy boundary.

C3r—53 to 58 inches; calcareous shale.

The A1 horizon is clay, silty clay, heavy silty clay loam, or clay loam. Reaction ranges from slightly acid to moderately alkaline. Cracks ¼ to 1 inch wide occur in the A1 horizon and upper part of the C horizon during the 3 to 5 dry months. The C horizon is dark gray, gray, grayish brown, dark grayish brown, light brownish gray, olive gray, or light olive gray. Lime occurs at a depth of 15 to 50 inches. Depth to bedrock commonly is 50 inches, but ranges from 40 to 60 inches.

DbD—Diablo clay, 9 to 15 percent slopes. This is a strongly sloping soil on uplands. Slopes are mostly 12 percent.

Included with this soil in mapping were areas of Linne soils, which make up 12 percent of the mapping unit; areas of Ayar, Cropley, and Nacimiento soils; and areas of clays that are similar to this Diablo clay, but less than 40 inches deep to bedrock. Areas of Diablo clay, 15 to 30 percent slopes, also were included. Areas of Antioch, Placentia, Santa Ynez, Salinas, and Cropley soils are included near Salinas and Castroville.

Runoff is medium, and the erosion hazard is slight.

This soil is used mostly for range or dryland grain. North of Salinas it is used for artichokes, pasture, and some irrigated row crops. Capability unit IIIe–5(15); Clayey range site.

DbE—Diablo clay, 15 to 30 percent slopes. This is a moderately steep soil on uplands. It has the profile described as representative of the series. Slopes are mostly about 20 percent.

Included with this soil in mapping were small areas of Linne, San Benito, Alo, Shedd, Rincon, and Nacimiento soils and clays that are similar to the Diablo clay, but less than 40 inches deep to bedrock. Also included were areas of Diablo clay, 30 to 50 percent slopes, and areas where gully erosion is moderate. Areas of Antioch, Santa Ynez, and Cropley soils and Aquic Xerofluvents are included near Salinas and Castroville.

Runoff is rapid, and the erosion hazard is moderate.

This soil is used mostly for range in the area east of King City. A few areas in the southeastern part of the county are used for dryland grain. Capability unit IVe–5(15); Clayey range site.

DbF—Diablo clay, 30 to 50 percent slopes. This is a steep soil on uplands. Exposure is mainly to the north. Slopes are mostly 38 percent.

Included with this soil in mapping were areas of Linne, Gazos, San Benito, and Alo soils. Also included were areas of Diablo clay, 15 to 30 percent slopes, small areas of gully erosion, and small areas of landslips.

Runoff is rapid, and the erosion hazard is high.

This soil is used mostly for range. Capability unit VIe-1(15); Clayey range site.

Dibble Series

The Dibble series consists of well drained soils that formed in material underlain by sandstone or shale. Slopes are 2 to 50 percent. The vegetation consists of coastal live oaks, a few digger pines, and annual grasses and forbs. The elevation is 900 to 1,500 feet. The mean annual precipitation is 18 to 27 inches, the mean annual air temperature is 60° to 65° F, and the frost-free season is about 200 days. Summers are hot and dry, and winters are cool and moist.

In a representative profile the surface layer is pale brown, slightly acid silt loam and clay loam 9 inches thick. The subsoil is pale brown and light yellowish brown, medium acid clay 31 inches thick. Yellowish brown weathered shale is at a depth of 40 inches.

Permeability is slow, and the available water capacity is 4 to 6 inches. Roots penetrate to a depth of 24 to 40 inches.

Dibble soils are used mostly for range, and some areas are part of the Hunter Liggett Military Reservation.

Representative profile of Dibble silt loam, 30 to 50 percent slopes, about 0.8 mile west on Sapaque Road from Pleyto-Bryson Road; 100 feet south up hill in NE¼SW¼ sec. 27, T. 24 S., R. 8 E.

Ap—0 to 3 inches; pale brown (10YR 6/3) heavy silt loam, brown (10YR 4/3) when moist; moderate medium and coarse angular blocky structure; hard, friable, sticky and plastic; many very fine roots; common very fine and few fine tubular pores; slightly acid; clear smooth boundary.

A12—3 to 9 inches; pale brown (10YR 6/3) clay loam, brown (10YR 4/3) when moist; moderate coarse prismatic and angular blocky structure; hard, friable, sticky and plastic; common very fine and few fine roots; common very fine and fine tubular pores; slightly acid; clear wavy boundary.

B21t—9 to 14 inches; pale brown (10YR 6/3) clay, brown (10YR 4/3) when moist; moderate medium angular blocky and prismatic structure; very hard, firm, very sticky and very plastic; few very fine, medium, and coarse roots; common very fine and few fine tubular pores; moderately thick clay films lining pores and on peds; medium acid; gradual wavy boundary.

B22t—14 to 27 inches; light yellowish brown (10YR 6/4) clay, yellowish brown (10YR 5/4) when moist; strong coarse prismatic structure; very hard, firm, very sticky and very plastic; few fine, medium, and coarse roots; common very fine and fine tubular pores; many moderately thick clay films lining pores and on faces of peds; medium acid; clear wavy boundary.

B23t—27 to 40 inches; pale brown (10YR 6/3) clay, brown (10YR 5/3) when moist; moderate coarse prismatic structure; very hard, firm, very sticky and very plastic; few fine, medium, and coarse roots; common very fine and fine tubular pores; many moderately thick clay films lining pores and on faces of peds; medium acid; clear wavy boundary.

Cr—40 to 49 inches; yellowish brown (10YR 5/6) weathered shale that crushes easily to clay loam; slightly acid.

The A horizon is light brownish gray, light gray, pale brown, very pale brown, brown, yellowish brown, or light yellowish brown. Texture is silt loam, silty clay loam, loam, clay loam, or sandy loam. Reaction is medium acid or slightly acid.

In some places there is a B1 horizon. The B2t horizon is brown, yellowish brown, pale brown, or light yellowish brown. Texture is commonly silty clay or clay, but ranges to heavy clay loam or silty clay loam in places. Reaction is medium acid to neutral.

The Cr horizon is yellowish brown or light yellowish brown, strong brown, light brown, or reddish yellow weathered shale. Depth to shale or sandstone ranges from 24 to 40 inches. In some places the bedrock is consolidated and cannot be crushed.

In Monterey County about 50 percent of the Dibble soils are more acid and have lower base saturation (50 to 75 percent) than is defined in the range of the series elsewhere in the State.

DcC—Dibble loam, 2 to 9 percent slopes. This is an undulating and gently rolling soil on uplands. The surface layer is very pale brown to light yellowish brown. The surface layer is loam or in places sandy loam. Where it is sandy loam it is generally underlain by sandstone. The subsoil is heavy clay loam. Pebbles make up about 5 percent of the soil.

Included with this soil in mapping were small areas of Gaviota soils on low knolls and, making up about 30 percent of the acreage, soils that have a clay subsoil. Also included were areas of somewhat poorly drained soils in swales; soils that have a neutral subsoil; soils that have a grayish brown and brown, slightly hard surface layer more than 10 inches thick; and some moderately eroded soils that are gullied. Some soils included in this unit have slopes of less than 2 percent or as much as about 20 percent.

Runoff is slow and medium, and the erosion hazard is moderate.

This soil is used chiefly for range and as the site of an artillery firing range and military manuevers. Military operations cause periodic fires in most areas. Capability unit IIIe-3(15); Loamy range site.

DdB—Dibble silt loam, 9 to 15 percent slopes. This is a strongly sloping soil on uplands.

Included with this soil in mapping were small areas of Placentia, Los Osos, and Arbuckle soils and Dibble loam, 2 to 9 percent slopes. Also included were some areas where sheet erosion is moderate.

Runoff is medium, and the erosion hazard is moderate.

This soil is used for range. Capability unit IIIe-3 (15); Loamy range site.

DdE—Dibble silt loam, 15 to 30 percent slopes. This is a moderately steep soil on uplands. It has a profile similar to the one described as representative of the series, but the surface layer is 8 to 12 inches thick.

Included with this soil in mapping were small areas of Los Osos, San Andreas, Gaviota, and Placentia soils and Dibble loam, 2 to 9 percent slopes. Also included were some areas where sheet erosion is moderate.

Runoff is medium to rapid, and the erosion hazard is moderate to high.

This soil is mostly used for range. Capability unit IVe-3(15); Loamy range site.

DdF—Dibble silt loam, 30 to 50 percent slopes. This is a steep soil on slightly convex uplands. It has a profile similar to the one described as representative of the series, but the surface layer is 6 to 11 inches thick.

Included with this soil in mapping were areas of San Andreas soils that make up 10 percent of the acreage and areas of Los Osos, Gazos, and Gaviota soils. Also included were soils that have a surface layer of pale brown loam and clay loam, which make up about 10

percent of the mapping unit, and some areas of soils that are similar to this Dibble soil but are 40 to 50 inches deep to bedrock.

Runoff is rapid, and the erosion hazard is high.

This soil is mostly used for range. Capability unit VIe–1(15); Loamy range site.

Docas Series

The Docas series consists of well drained soils that formed in alluvium derived from calcareous sandstone and shale on alluvial fans and plains. Slopes are 0 to 9 percent. The vegetation consists of annual grasses and forbs. The elevation is 300 to 2,000 feet. The mean annual precipitation is 10 to 12 inches, the mean annual air temperature is 59° to 60° F, and the frost-free season is about 210 days. Summers are hot and dry, and winters cool and moist.

In a representative profile the surface layer is gray, calcareous silty clay loam 23 inches thick. The underlying material is light gray, calcareous silty clay loam that extends to a depth of 60 inches or more.

Permeability is moderately slow, and the available water capacity is 9 to 11 inches. Roots penetrate to a depth of more than 60 inches.

Docas soils are used mostly for dryland grain and pasture. Areas that have water for irrigation are used for alfalfa and row crops.

Representative profile of Docas silty clay loam, 2 to 9 percent slopes, east of San Lucas; 6.4 miles east from the Southern Pacific Railroad crossing on State Highway 198 and 100 feet south into field in NE¼SW¼ NE¼ sec. 31, T. 21 S., R. 10 E.

Ap1—0 to 3 inches; gray (10YR 6/1) silty clay loam, very dark grayish brown (2.5Y 3/2) when moist; strong medium and thick platy structure; slightly hard, friable, sticky and plastic; few very fine roots; many very fine tubular pores and common fine interstitial pores; slightly effervescent with disseminated lime; moderately alkaline; clear wavy boundary.

Ap2—3 to 9 inches; gray (10YR 6/1) silty clay loam, very dark grayish brown (2.5Y 3/2) when moist; moderate medium and coarse subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine roots; many very fine and few fine tubular pores; slightly effervescent with disseminated lime; moderately alkaline; clear smooth boundary.

A13—9 to 23 inches; gray (10YR 6/1) silty clay loam, very dark grayish brown (2.5Y 3/2) when moist; moderate coarse subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine roots; many very fine and common fine tubular pores; strongly effervescent with disseminated lime; moderately alkaline; gradual wavy boundary.

C1—23 to 42 inches; light gray (2.5Y 7/2) silty clay loam, grayish brown (2.5Y 4/2) when moist; weak coarse subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine roots; many very fine and common fine tubular pores; violently effervescent with segregated lime in filaments; moderately alkaline; diffuse wavy boundary.

C2—42 to 62 inches; light gray (2.5Y 7/2) silty clay loam, dark grayish brown (2.5Y 4/2) when moist; massive; slightly hard, friable, sticky and plastic; few very fine roots; many very fine and few coarse tubular pores; violently effervescent with segregated lime in filaments; moderately alkaline.

The A horizon is gray, light brownish gray, light olive gray, or light gray. Texture commonly is silty clay loam, but ranges to loam or silty loam in places. Reaction is moderately alkaline and is slightly to strongly calcareous. The C horizon has colors similar to the A horizon, and texture ranges from sandy loam to silty clay loam and is stratified in some places. This horizon is slightly calcareous to strongly calcareous.

DeA—Docas silty clay loam, 0 to 2 percent slopes. This soil is on alluvial fans.

Included with this soil in mapping were small areas of Sorrento, Salinas, Rincon, Mocho, Cropley, Linne, and Shedd soils. Also included were a few areas of soils that have steeper slopes, some areas where gully erosion is severe, and some areas of soils that have a noncalcareous surface layer.

Runoff is slow, and the erosion hazard is slight.

This soil is used mostly for irrigated row crops and alfalfa. Some areas are used for dryland grain. Capability units I(14), IIIc–1(15); range site not assigned.

DeC—Docas silty clay loam, 2 to 9 percent slopes. This is a gently sloping to moderately sloping soil on alluvial fans and plains. It has the profile described as representative of the series.

Included with this soil in mapping were areas of Sorrento soils that make up about 12 percent of the acreage and areas of Mocho, Cropley, Rincon, Salinas, Shedd, Linne, Ayar, and Snelling soils. Also included were a few areas where the surface layer is not calcareous.

Runoff is medium, and the erosion hazard is moderate.

This soil is used mostly for dryland grain and pasture. Where irrigation water is available, it is used for alfalfa and row crops. This soil puddles easily, which reduces the rate at which water enters the soil. Capability unit IIe–1(14); range site not assigned.

Dune Land

Df—Dune land. This mapping unit consists of gently sloping to steep areas of loose wind-deposited quartz and feldspar sand on hummocks, mounds, and hills. The elevation ranges from 20 to 300 feet. Some dunes are partly stabilized by coastal or inland vegetation, and other dunes are blowing, shifting, and encroaching onto adjacent lands. If vegetation is present, it consists of ice plant, brush lupine, small coastal brush, and a few flowering plants and grasses.

Included in mapping were areas of Baywood, Oceano, Garey, and Narlon soils and Coastal beaches. In some places loose sand has accumulated as a result of wind action and is underlain by loam, clay, or bedrock at a depth of 3 to 6 feet. Some wet seeps or small ponds were included where there are small depressions or enclosed basins.

Drainage is excessive, and permeability is rapid. The available water capacity is 2 or 3 inches. Runoff is very slow or slow. The soil blowing hazard is high or very high. Roots can penetrate to a depth of 60 inches.

This land type is used mostly for recreation and some wildlife habitat, but some areas are being stabilized and used for golf courses and building sites. It has little or no value for farming. Near Spanish Bay and Point Joe, it is a source of quartz sand used in the manufacture of glass. Capability unit VIIIe–1(15); range site not assigned.

Elder Series

The Elder series consists of well drained soils on alluvial fans and in small valleys. These soils formed in alluvium derived from granitic and sedimentary rocks. Slopes are 0 to 9 percent. The vegetation consists of annual grasses, forbs, and scattered oaks. The elevation is 50 to 1,400 feet. The mean annual precipitation is 12 to 30 inches, the mean annual air temperature is 57° to 60° F, and the frost-free season ranges from 150 days in the interior valleys to 250 days in the Salinas Valley. Summers are mainly warm and dry, though they are often foggy in the Salinas Valley and hot and dry in the interior mountain valleys; winters are cool and moist.

In a representative profile the surface layer is grayish brown, slightly acid and dark brown, neutral sandy loam about 37 inches thick. The underlying material is yellowish brown, mildly alkaline and moderately alkaline stratified fine gravelly sandy loam and fine gravelly loamy coarse sand that extends to a depth of 73 inches or more.

Elder soils are used for irrigated row crops, vineyards, orchards, annual pasture, and dryland grain and hay. They are also the site of military operations.

Representative profile of Elder sandy loam, 0 to 2 percent slopes, about 3 miles north of Chualar; 0.58 mile NW on Old Stage Road from Esperanzar Road, 275 feet NE on farm road, and 24 feet NW into field.

Ap—0 to 9 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) when moist; weak thick platy structure and moderate medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine and few medium roots; common very fine tubular pores; 10 percent fine angular gravel and 15 percent very coarse sand; slightly acid; clear smooth boundary.

A12—9 to 22 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) when moist; weak coarse angular blocky structure; slightly hard, friable, nonsticky and nonplastic; many very fine, common fine, and few medium roots; many very fine interstitial pores and few medium tubular pores; 10 percent fine angular gravel and 15 percent very coarse sand; slightly acid; clear smooth boundary.

A13—22 to 37 inches; dark brown (10YR 4/3) sandy loam, dark brown (10YR 3/3) when moist; massive; slightly hard, friable, nonsticky and nonplastic; many very fine and few medium roots; many very fine interstitial pores and many very fine and few medium tubular pores; 10 percent fine angular gravel and 15 percent very coarse sand; neutral; diffuse smooth boundary.

IIC1—37 to 52 inches; yellowish brown (10YR 5/4) fine gravelly sandy loam, dark brown (10YR 4/3) when moist; massive; slightly hard, friable, nonsticky and nonplastic; many very fine and few medium roots; common very fine interstitial and tubular pores; 20 percent fine angular gravel and 10 percent very coarse sand; mildly alkaline; diffuse smooth boundary.

IIC2—52 to 73 inches; yellowish brown (10YR 5/4) stratified fine gravelly loamy coarse sand, dark yellowish brown (10YR 4/4) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine roots; many very fine interstitial and tubular pores; 20 percent fine angular gravel; moderately alkaline.

The A horizon is very dark gray, dark gray, dark grayish brown, grayish brown, or brown. Texture is loam, sandy loam, fine sandy loam, very fine sandy loam, or coarse sandy loam and, in some places, gravelly. Reaction ranges from medium acid to mildly alkaline. The A horizon is 20 to 40 inches thick.

The C horizon is brown, yellowish brown, pale brown, gray, or light yellowish brown. Texture ranges from sandy loam to loamy coarse sand that is 5 to 30 percent pebbles. Gravel content commonly increases in the lower part of the C horizon, and the horizon is stratified gravel and cobblestones below a depth of 40 to 60 inches. Reaction ranges from neutral to moderately alkaline, and alkalinity commonly increases with depth. The horizon is noncalcareous. In some areas, sandstone or shale is at a depth of 40 to 72 inches.

EaA—Elder sandy loam, 0 to 2 percent slopes. This is a nearly level soil on alluvial fans and plains. It has the profile described as representative of the series.

Included with this soil in mapping, and each making up about 10 percent of the acreage, were Arroyo Seco and Gorgonio soils. Also included were areas of Hanford, Danville, Chualar, Salinas, and Tujunga soils, some small areas of soils that have gravel and cobblestones at a depth of 24 to 60 inches, and areas where the surface layer is massive and hard or is light brownish gray.

Permeability is moderate, and the available water capacity is 6 to 9 inches. Roots can penetrate to a depth of more than 60 inches. Runoff is slow, and the erosion hazard is slight.

The soil is used mostly for irrigated field and row crops. In some places it is used for orchards or vineyards. Capability unit IIs–4(14); range site not assigned.

EbC—Elder very fine sandy loam, 2 to 9 percent slopes. This is a gently sloping and moderately sloping, slightly hummocky soil that occupies small areas in narrow valleys. It formed on alluvial fans, terraces, and flood plains. It has a profile similar to the one described as representative of the series, but sandstone or shale is at a depth of 40 to 72 inches. Slopes are mostly about 3 percent.

Included with this soil in mapping were areas of Elder sandy loam, 0 to 2 percent slopes, and Arroyo Seco, Lockwood, Santa Lucia, and San Andreas soils. Also included, and each making up about 15 percent of the acreage, were areas of soils that have a surface layer less than 20 inches thick and areas of soils that have slopes of less than 2 percent.

Permeability is moderate. Runoff is slow, and the erosion hazard is moderate. Roots can penetrate to a depth of 40 to 60 inches, and the available water capacity is about 6 to 11 inches.

This soil is used mainly for annual pasture, and much of it is on the Hunter Liggett Military Reservation. Small areas are used for annual hay-grain crops. Capability units IIe–1(14), IIIe–1(15); range site not assigned.

EcA—Elder loam, gravelly substratum, 0 to 2 percent slopes. This soil is on alluvial fans or plains. It has a profile similar to the one described as representative of the series, but the surface layer is loam, fine sandy loam, or very fine sandy loam and commonly lacks gravel. The gravel content ranges from 0 to 5 percent, and depth to gravel or cobblestones is 40 to 50 inches. Slopes are mostly 1 percent or less.

Included with this soil in mapping, and each making up about 10 percent of the acreage, were Arroyo Seco soils and Elder sandy loam, 0 to 2 percent slopes. Also

included were areas of Chualar, Hanford, Danville, and Lockwood soils, areas where depth to the gravel or cobblestone substratum ranges from 24 to 40 inches, and areas that have a surface layer of light brownish gray, massive, hard clay loam.

Permeability is moderate above the very rapidly permeable underlying material, and the available water capacity is 5.5 to 8 inches. Roots can penetrate to a depth of 40 to 50 inches. Runoff is slow, and the erosion hazard is slight.

This soil is used for irrigated field and row crops, orchards, and some vineyards. Capability unit IIs-4 (14); range site not assigned.

Elkhorn Series

The Elkhorn series consists of well drained soils on marine terraces and dunelike hills. These soils formed in material underlain by weakly consolidated sandy sediments or ferruginous sandstone. Slopes are 2 to 30 percent. The vegetation consists of annual grasses, forbs, brushy plants, and a few scattered oaks. The elevation is 50 to 500 feet. The mean annual precipitation is 12 to 20 inches, the mean annual air temperature is about 57° F, and the frost-free season is about 270 days. Summers are warm and foggy, and winters are cool and moist.

In a representative profile the surface layer is brown, neutral to medium acid fine sandy loam 26 inches thick. The subsoil is brown, medium acid sandy clay loam 20 inches thick. The substratum is strong brown, slightly acid fine sandy loam that extends to a depth of more than 63 inches.

Permeability is moderately slow, and the available water capacity is 7.5 to 9 inches. Roots penetrate to a depth of more than 60 inches.

Elkhorn soils are used mostly for specialty crops such as brussels sprouts, strawberries, artichokes, and broccoli. Some are used for annual pasture, hay, or range.

Representative profile of Elkhorn fine sandy loam, 9 to 15 percent slopes, about 4 miles north of Moss Landing; 2,600 feet west, 3,000 feet north of Springfield Road from the intersection with State Highway 1. The site is about 20 feet east of the road.

Ap1—0 to 9 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) when moist; moderate medium and coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many very fine and few medium roots; few very fine tubular pores; neutral; clear smooth boundary.

Ap2—9 to 17 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) when moist; weak and moderate coarse angular blocky structure; hard, firm, slightly sticky and slightly plastic; common very fine and few medium roots; few very fine and fine tubular pores and few very fine interstitial pores; slightly acid; clear smooth boundary.

A3—17 to 26 inches; brown (10YR 5/3) heavy fine sandy loam, dark brown (10YR 3/3) when moist; weak and moderate medium and coarse angular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine and fine and few medium roots; many medium, fine, and very fine tubular pores and many very fine interstitial pores; many worm casts; medium acid; clear irregular boundary.

B2t—26 to 46 inches; brown (7.5YR 5/4) sandy clay loam, mixed dark brown and reddish brown (7.5YR 4/4, 5YR 4/4) when moist; weak coarse angular blocky structure; very hard, firm, sticky and slightly plastic; few very fine and very few fine roots; few fine tubular pores and common very fine interstitial pores; few thin discontinous clay films on faces of peds and lining pores; many distinct medium and coarse weakly cemented concretions; medium acid; gradual wavy boundary.

C—46 to 63 inches; strong brown (7.5YR 5/6) fine sandy loam, mixed strong brown and dark brown (7.5YR 5/6 and 4/4) when moist; massive; very hard, firm, slightly sticky and slightly plastic; few very fine and very few fine roots; few coarse tubular pores and common very fine interstitial pores; few thin distinct clay films lining pores; few medium faint weakly cemented concretions; slightly acid.

The A horizon is dark grayish brown, grayish brown, gray, or brown. Texture is sandy loam, fine sandy loam, loam, or heavy fine sandy loam. Structure is blocky or granular. The lower part of the A horizon, below the Ap horizon, commonly is slightly more acid than the Ap or B2t horizons. In some places, fine to coarse (1 to 5 millimeters) concretions occur in the lower part of the A horizon, the B2t horizon, and the C horizon. An A3 horizon or B1 horizon 6 to 12 inches thick is common.

The B2t horizon ranges from dark brown to light yellowish brown, and texture is sandy clay loam or heavy sandy loam. Reaction ranges from medium acid to neutral. When dry, the soil material is hard to extremely hard.

The C horizon ranges from brown to reddish yellow, and texture ranges from loamy sand to light sandy clay loam. Reaction is medium acid to neutral.

EdB—Elkhorn fine sandy loam, 2 to 5 percent slopes. This is a gently sloping soil on dunelike marine terraces and on benches that have smooth, undulating slopes. It has a profile similar to the one described as representative of the series, but the surface layer is typically gray or grayish brown.

Included with this soil in mapping were areas of Santa Ynez, Oceano, and Cropley soils and the Elkhorn variant. Also included were areas that have slopes somewhat steeper than 5 percent, some areas where a dense, compact clay layer underlies the subsoil below a depth of 45 inches, and some small depressions or basins that are ponded several times a year.

Runoff is slow, and the erosion hazard is slight.

This soil is used mostly for such specialty crops as artichokes, brussels sprouts, broccoli, and strawberries. Capability unit IIe-1 (14); range site not assigned.

EdC—Elkhorn fine sandy loam, 5 to 9 percent slopes. This is a moderately sloping soil on marine terraces and benches. It has a profile similar to the one described as representative of the series, but the surface layer commonly is grayish brown and is 20 to 35 inches thick. The surface layer is more than 35 inches thick on foot slopes.

Included with this soil in mapping were areas of Elkhorn fine sandy loam, 9 to 15 percent slopes. Also included were small areas that are underlain by clay below a depth of about 45 inches.

Runoff is slow to medium, and the erosion hazard is slight to moderate.

This soil is used mostly for such specialty crops as artichokes, broccoli, brussels sprouts, and strawberries. Capability unit IIe-1 (14); range site not assigned.

EdD—Elkhorn fine sandy loam, 9 to 15 percent slopes. This is a strongly sloping soil on marine terraces and benches. It has the profile described as representative of the series.

Included with this soil in mapping were areas of Arnold, Oceano, and Santa Ynez soils, the Elkhorn variant, and Elkhorn soils that have slopes of more than 15 percent and less than 9 percent. Also included were small areas that have a surface layer less than 20 inches thick and areas that have buried clay at a depth of more than 45 inches.

Runoff is medium, and the erosion hazard is moderate.

This soil is used mostly for such specialty crops as brussels sprouts, artichokes, broccoli, and strawberries. Capability unit IIIe–1(14); range site not assigned.

Elkhorn Variant

The Elkhorn variant consists of well drained soils on marine terraces and dunelike hills. These soils formed in material underlain by weakly consolidated sandy marine sediments. Slopes are 5 to 30 percent. The vegetation consists of annual grasses, forbs, coastal chaparral, and a few oaks, Monterey pine, and eucalyptus. The elevation is about 50 to 500 feet. The mean annual precipitation is about 14 to 20 inches, the mean annual air temperature is about 57° F, and the frost-free season is about 270 days. Summers are warm and foggy, and winters are cool and moist.

In a representative profile the surface layer is brown, slightly acid fine sandy loam about 12 inches thick. The subsoil is brown and strong brown, slightly acid fine sandy loam and clay loam 13 inches thick. The underlying material is weakly consolidated loamy fine sand that extends to a depth of more than 60 inches.

Permeability is slow, and the available water capacity is 4 to 6 inches. Roots penetrate to a depth of 24 to 40 inches.

Elkhorn variant soils are used mostly for annual pasture. Some areas are used for strawberries, artichokes, broccoli, brussels sprouts, and some hay or grain.

Representative profile of Elkhorn fine sandy loam, thin surface variant, 15 to 30 percent slopes, about 50 feet ESE from top of embankment of State Highway 156, 0.3 mile WSW of intersection of Meredian Road, in the Prunedale area.

A11—0 to 5 inches; brown (10YR 5/3) fine sandy loam, dark brown (7.5YR 3/2) when moist; weak medium subangular blocky and crumb structure; slightly hard, very friable, nonsticky and nonplastic; many fine roots; many very fine interstitial pores and common fine and medium tubular pores; slightly acid; abrupt smooth boundary.

A12—5 to 12 inches; brown (10YR 5/3) fine sandy loam, dark brown (7.5YR 3/3 and 4/4) when moist; weak angular blocky structure; hard, very friable, nonsticky and nonplastic; common fine and few very fine roots; many very fine interstitial pores and common fine and medium tubular pores; slightly acid; clear wavy boundary.

B1—12 to 17 inches; brown (10YR 5/3) fine sandy loam, dark brown (7.5YR 3/3 and 4/4) when moist; weak coarse subangular blocky structure; very hard, friable, slightly sticky and slightly plastic; few very fine and fine roots; many very fine interstitial pores and many very fine and common fine and medium tubular pores; slightly acid; clear wavy boundary.

B2t—17 to 25 inches; strong brown (7.5 YR 5/6) clay loam, dark brown (7.5YR 4/4) when moist; strong medium and coarse angular blocky structure; very hard, friable, sticky and plastic; few very fine roots; common very fine tubular and interstitial pores; many brown (10YR 5/3), dark brown (10YR 3/3) when moist, thick and moderately thick clay films on faces of peds; common moderately thick clay films bridging mineral grains and lining pores; about 40 percent of horizon is color of clay films in matrix, about 75 percent is color of clay films on ped faces; slightly acid; abrupt wavy boundary.

C—25 to 60 inches; weakly consolidated marine sediments; crushes to strong brown (7.5YR 5/6) loamy fine sand, dark brown (7.5YR 4/4) when moist; upper part filled with clay films in a few narrow vertical fractures; material difficult to cut with augers by hand, becoming harder as moisture decreases; slightly acid.

The soil profile ranges from medium acid to neutral. The A1 horizon is dark grayish brown, grayish brown, or brown, and texture is sandy loam, fine sandy loam, or very fine sandy loam. In places there is an A3 horizon similar to the A1 horizon, but it is brown, dark brown, dark yellowish brown, or yellowish brown. An A3 horizon and B1 horizon typically do not occur in the same profile.

The B1 horizon has the same colors as the A3 horizon and about 5 percent more clay than the A1 horizon. The B2t horizon ranges from brown or strong brown to light yellowish brown. Texture is loam, sandy clay loam, or clay loam that is about 20 to 30 percent clay. When dry, the soil material ranges from hard to extremely hard.

The C horizon occurs mostly at a depth of 24 to 40 inches and consists mainly of weakly consolidated sediments or weathered sandstone. It ranges from brown to reddish yellow or yellowish brown. The sediments crush to loamy sand or light fine sandy loam and tend to harden upon rewetting and drying. The material is cut with difficulty by hand tools and resists root penetration.

EeD—Elkhorn fine sandy loam, thin surface variant, 5 to 15 percent slopes. This is a moderately sloping and strongly sloping soil on marine terraces. It has a profile similar to the one described as representative of the variant, but depth to weakly consolidated sandy sediments or soft sandstone is typically 30 to 40 inches. Slopes are mostly about 7 to 12 percent.

Included with this soil in mapping were areas of Elkhorn soils, mainly in swales, making up about 20 percent of the acreage; areas of Santa Ynez, Arnold, and Oceano soils; and areas that have slopes of less than 5 percent or more than 15 percent.

Runoff is medium, and the erosion hazard is moderate.

This soil is used for such specialty crops as brussels sprouts, strawberries, cabbage, and artichokes and for annual pasture. Capability unit IIIe–3(14); range site not assigned.

EeE—Elkhorn fine sandy loam, thin surface variant, 15 to 30 percent slopes. This is a moderately steep soil on hills and marine terraces. It has the profile described as representative of the variant. It is 24 to 36 inches deep to the consolidated sediments. Slopes are mostly 15 to 25 percent.

Included with this soil in mapping were areas of Elkhorn soils that make up about 15 percent of the acreage and areas of Arnold, Santa Ynez, and Oceano soils. Included near State Highway 1 and Pajaro Valley were areas of this Elkhorn variant that have slopes of more than 30 percent that make up about 20 percent of the mapping unit. Also included were areas where the surface layer is less than 10 inches thick and some areas that are gullied or areas where the surface layer has been completely removed and the subsoil exposed.

Runoff is rapid, and the erosion hazard is high. This soil is erodible and is subject to landslips in some

places, especially when saturated for extended periods.

This soil is used mostly for annual pasture, but it is also used for broccoli, brussels sprouts, strawberries, and other specialty crops and for annual hay. Some areas are being developed for homesites. Capability unit IVe-3 (14) ; Fine Loamy range site.

Fluvents, Stony

Fa—Fluvents, stony. This land type consists of nearly level to strongly sloping stony and cobbly areas on flood plains, in drainageways, and on alluvial fans. The soil is light brownish gray and grayish brown stratified sandy loam and sand that has about 25 to 50 percent cobbles, stones, and pebbles on the surface and throughout the profile. The soil is stratified in an irregular pattern and changes greatly in very short distances. Channels are common. The soil is mostly in relatively small, narrow areas adjacent to creeks and rivers. These areas are subject to flooding, deposition, and scouring during high- or medium-intensity storms. The elevation ranges from 100 to 2,000 feet. The vegetation consists mostly of annual grasses, shrubs, forbs, oaks, sycamores, and some willows.

Included in mapping were areas of Gorgonio, Tujunga, Arroyo Seco, and Elder soils. Areas of Psamments and Fluvents were also included.

Drainage is somewhat excessive, and permeability ranges from moderately rapid to very rapid. The available water capacity is 2 to 4 inches. Runoff ranges from medium to very slow. The erosion hazard is moderate in some areas because of channeling and deposition. Roots can penetrate to a depth of 36 to 60 inches.

This land is used mostly for watershed, wildlife habitat, recreation, and grazing. Because of the stones, it is very difficult to cultivate. Capability unit VIIs-1 (15) ; range site not assigned.

Gamboa Series

The Gamboa series consists of somewhat excessively drained soils on uplands. These soils formed in material underlain by sandstone, schistose, or granitic bedrock. Slopes are 50 to 100 percent. The vegetation consists of redwood, laurel, tanoak, madrone, and a few incense cedar, Douglas-fir, white fir, and bigleaf maple. The elevation is 200 to 3,000 feet. The mean annual precipitation is 30 to 70 inches, the mean annual air temperature is about 54° F, and the frost-free season is 200 to 300 days. Summers are cool and foggy, and winters are cool and moist.

In a representative profile the soil is very dark gray and very dark grayish brown, mildly alkaline and neutral very gravelly fine sandy loam about 59 inches thick. It is underlain by light brownish gray sandstone.

Permeability is rapid, and the available water capacity is 2 to 4 inches. Roots penetrate to a depth of 40 to 60 inches.

Gamboa soils are used mostly for watershed, wildlife habitat, and recreation.

Representative profile of Gamboa very gravelly fine sandy loam, in an area of Gamboa-Sur complex, about 0.5 mile east of the Forest Service Ranger Station at Pacific Valley near the east 1/4 corner of sec. 18, T. 23 S., R. 5 E.; about 235 feet west of a Forest Service boundary fence.

O1&O2—2 inches to 0; litter mainly from redwood leaf fall; medium acid; abrupt wavy boundary.

A11—0 to 23 inches; very dark gray (10YR 3/1) very gravelly fine sandy loam, black (10YR 2/1) when moist; weak fine crumb structure; soft, very friable, nonsticky and nonplastic; many very fine and fine and common medium and coarse roots; many very fine interstitial pores; 60 percent angular gravel; mildly alkaline; clear wavy boundary.

A12—23 to 30 inches; very dark gray (10YR 3/1) very gravelly fine sandy loam, black (10YR 2/1) when moist; massive; soft, very friable, nonsticky and nonplastic; many very fine and fine and common medium and coarse roots; many very fine interstitial pores; 60 percent angular gravel; white mycelial mold that is strongly acid; neutral; gradual wavy boundary.

A13—30 to 59 inches; very dark grayish brown (10YR 3/2) very gravelly fine sandy loam, very dark brown (10YR 2/2) when moist; massive; soft, very friable, nonsticky and nonplastic; common very fine, fine, and coarse and many medium roots; many very fine interstitial pores; 75 percent pebbles, cobblestones, and stones; neutral; clear irregular boundary.

R—59 to 72 inches; light brownish gray (2.5Y 6/2) fractured sandstone; few very fine, fine, medium, and coarse roots in fractures.

Depth to bedrock ranges from 40 to 60 inches. Gravel, cobblestones, and stones make up 35 to 70 percent of the profile. Reaction is mildly alkaline to medium acid. Texture is loam, fine sandy loam, or sandy loam and is gravelly or very gravelly. The A horizon is black to dark brown.

Ga—Gamboa-Sur complex. This mapping unit is mostly in the Los Padres National Forest and the Ventana Wilderness. The soils formed in material that was derived from sandstone, schistose, or granitic rocks on uplands. They were so intermingled or so small in extent that it was not feasible to map them separately at the scale used. Slopes are 50 to 100 percent.

Gamboa soils make up about 35 percent of this complex and Sur soils 25 percent. The Gamboa soil has the profile described as representative of the series. It typically is on lower, concave side slopes. The Sur soil typically is on convex side slopes. Junipero soils make up about 15 percent of this complex, and the rest consists of Plaskett, McMullin, Los Osos, and Gazos soils and areas of a very dark grayish brown, very strongly acid, very gravelly sandy loam that is 20 to 40 inches deep to bedrock.

Runoff is very rapid, and the erosion hazard is very high.

This complex is used for recreation, watershed, and wildlife habitat. If it is used for growing redwood, the Gamboa soil is highly productive and has a site index of about 215. Seedling mortality is low, and the windthrow hazard is slight. Equipment limitation is severe. The Sur soil has low productivity and has a site index of about 130. Seedling mortality is moderate, and the windthrow hazard is slight. Equipment limitation is severe. Capability unit VIIIe-1 (15) ; range site not assigned.

Garey Series

The Garey series consists of well drained soils that formed on dunelike terraces in coarse textured wind-modified deposits. Slopes are 2 to 50 percent. The

vegetation consists of annual grasses, forbs, and a few scattered oaks. The elevation is 300 to 1,000 feet. The mean annual precipitation is 10 to 14 inches, the mean annual air temperature is about 60° F, and the frost-free season is about 220 days. Summers are warm and dry, and winters are cool and moist.

In a representative profile the surface layer is about 30 inches thick. It is grayish brown and brown, slightly acid sandy loam and pale brown, slightly acid loamy sand. The subsoil is light yellowish brown, slightly acid and neutral sandy loam 26 inches thick. Below this is very pale brown, neutral loamy sand that extends to a depth of more than 60 inches.

Permeability is moderately slow, and the available water capacity is 4 to 6 inches. Roots penetrate to a depth of more than 60 inches.

Garey soils are used mostly for pasture, range, watershed, and wildlife habitat. A few areas that have gentler slopes are used for irrigated field crops and alfalfa hay.

Representative profile of Garey sandy loam, 2 to 9 percent slopes, south of King City, about 2,400 feet NE on Oasis Road from Jolon Road; 1/4 mile SE on dirt road and 25 feet east into field.

Ap—0 to 3 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) when moist; strong medium platy structure; slightly hard, very friable, nonsticky and nonplastic; many fine and very fine and few medium roots; few fine tubular pores; slightly acid; abrupt smooth boundary.

A12—3 to 10 inches; brown (10YR 5/3) light sandy loam, dark brown (10YR 3/3) when moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few fine and common very fine roots; common very fine and fine tubular pores; slightly acid; clear smooth boundary.

A13—10 to 19 inches; brown (10YR 5/3) light sandy loam, dark brown (10YR 3/3) when moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and common fine roots; few fine and common very fine tubular pores; slightly acid; gradual wavy boundary.

A14—19 to 24 inches; brown (10YR 5/3) light sandy loam, dark brown (10YR 4/3) when moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine, fine, and medium tubular pores; slightly acid; gradual wavy boundary.

A3—24 to 30 inches; pale brown (10YR 6/3) loamy sand, dark brown (10YR 4/3) when moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine and common fine tubular pores; slightly acid; abrupt wavy boundary.

B21t—30 to 46 inches; light yellowish brown (10YR 6/4) sandy loam, dark yellowish brown (10YR 4/4) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; very few very fine roots; many very fine and few fine interstitial pores; common thin clay films on mineral grains, four hard, dark brown (7.5YR 3/2) clay bands 1/2 to 1 inch thick; slightly acid; clear wavy boundary.

B22t—46 to 56 inches; light yellowish brown (10YR 6/4) sandy loam, dark yellowish brown (10YR 4/4) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; very few fine roots; common very fine and few fine interstitial pores; common thin clay films on mineral grains; five hard, dark brown (10YR 4/3) clay bands about 1/2 inch thick; neutral; abrupt wavy boundary.

C—56 to 64 inches; very pale brown (10YR 7/3) loamy sand, brown (10YR 5/3) when moist; massive; soft; very friable, nonsticky and nonplastic; very few fine roots; common very fine interstitial pores; neutral.

The A1 horizon is grayish brown, light brownish gray, or pale brown. Texture is generally sandy loam, but it is loamy sand or loamy fine sand in places. Reaction is slightly acid to strongly acid. An A3 or B1 horizon occurs in most places.

The B2t horizon is light yellowish brown, pale brown, light brown, or very pale brown. The bands of brown and dark brown clay range from about 1/4 inch to 1 1/4 inches thick. Texture between the clay bands is commonly sandy loam, but it is light sandy loam or loamy sand in places. Reaction is slightly acid to neutral.

The C horizon is mostly stratified light loamy sand and loamy sand that has been reworked by the wind. Depth to the wind-modified deposits ranges from about 38 to 65 inches. In some places the C horizon is underlain by silt, shale, or sandstone.

In Monterey County the Garey soils are neither as hard nor as acid in the B2t horizon as elsewhere in California. They also have fewer clay bands.

GbC—Garey sandy loam, 2 to 9 percent slopes. This is an undulating and gently rolling soil on dunelike terraces. It has the profile described as representative of the series. Slopes are mostly about 5 percent.

Included with this soil in mapping were areas of Snelling, Greenfield, Rincon, and Oceano soils. Also included were some eroded areas and some areas of Garey soils that have slopes of more than 9 percent.

Runoff is medium, and the erosion hazard is moderate.

This soil is used mostly for annual pasture, but some areas are used for irrigated field crops and alfalfa hay. Capability units IIe-1(14), IIIe-1(15); Coarse Loamy range site.

GbE—Garey sandy loam, 9 to 30 percent slopes. This is a rolling to hilly soil on terraces. Slopes are mostly 16 percent.

Included with this soil in mapping were areas of Greenfield, Placentia, Rincon, Oceano, and Nacimiento soils. Also included were areas of Garey sandy loam, 2 to 9 percent slopes; areas of a soil that is similar, but has a surface layer of dark grayish brown sandy loam; and some areas that are moderately eroded.

Runoff is medium to rapid, and the erosion hazard is moderate to high.

This soil is mostly used for range. Capability unit IVe-1(15); Coarse Loamy range site.

GbF2—Garey sandy loam, 30 to 50 percent slopes, eroded. This is a steep soil on dunelike terraces. It has a profile similar to the one described as representative of the series, but the surface layer is 15 to 20 inches thick and is fine sandy loam in some areas. About 25 to 50 percent of the original surface layer has been removed by soil blowing and water erosion.

Included with this soil in mapping were areas of Linne, Arnold, San Andreas, Nacimiento, and Shedd soils. Also included were areas of a soil that has a surface layer of dark grayish brown and areas that are moderately to severely eroded.

Runoff is rapid, and the erosion hazard is high.

This soil is used mostly for range, watershed, and wildlife habitat. Capability unit VIe-1(15); Coarse Loamy range site.

Gc—Garey-Oceano complex. The soils in this complex formed in dunelike deposits on high terraces. They were so intermingled that it was not feasible to map them separately at the scale used. Slopes are 15 to 50 percent.

Garey soils make up about 55 percent of this complex and Oceano soils 30 percent. The rest consists of areas

of Greenfield, Rincon, Nacimiento, and Snelling soils and small areas where there is sheet and rill erosion.

Runoff is medium to rapid on the Garey soil and medium on the Oceano soil. The erosion hazard is moderate to very high on both soils.

This complex is used mostly for range. A few small areas that have moderately steep slopes are used for dryland grain. Capability unit VIIe-1(15); Garey soil in Coarse Loamy range site, Oceano soil in Sandy range site.

Gaviota Series

The Gaviota series consists of somewhat excessively drained soils on uplands. These soils formed in material underlain by sandstone. Slopes are 15 to 75 percent. The vegetation is mainly annual grasses and some scattered thickets of scrub oak, digger pine, and brush. The elevation is 1,000 to 3,500 feet. The mean annual precipitation is 15 to 35 inches, the mean annual air temperature is about 60° F, and the frost-free season is 200 to 270 days. Summers are hot and dry, and winters are cool and moist.

In a representative profile the soil is brown, neutral sandy loam underlain by sandstone at a depth of 12 inches.

Permeability is moderately rapid, and the available water capacity is 1 to 3 inches. Roots penetrate to a depth of 10 to 20 inches.

Gaviota soils are mostly used for range, watershed, and wildlife habitat.

Representative profile of Gaviota sandy loam, 30 to 75 percent slopes, in the general area of Paloma Creek, about 1 mile NNE from the junction of Tash Creek and Paloma Creek, in NW¼NE¼ sec. 6, T. 19 S., R. 5 E.

A11—0 to 2 inches; brown (10YR 4/3) sandy loam, dark brown (7.5YR 3/2) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine interstitial pores; neutral; clear smooth boundary.

A12—2 to 12 inches; brown (10YR 5/3) sandy loam, brown (7.5YR 4/3) when moist; massive; soft, very friable, nonsticky and nonplastic; common very fine and few fine and medium roots; common very fine interstitial pores; neutral; abrupt wavy boundary.

R—12 to 15 inches; yellow (10YR 8/6), massive, hard, fine grained sandstone.

The A1 horizon ranges from grayish brown to very pale brown, and in some places the upper 1 inch to 4 inches is dark grayish brown or dark brown. Texture is loam, fine sandy loam, sandy loam, or gravelly coarse sandy loam. Reaction is medium acid to neutral. Depth to hard bedrock ranges from 10 to 20 inches. There are a few stones on the surface.

GdE—Gaviota sandy loam, 15 to 30 percent slopes. This is a moderately steep soil on uplands. It has a profile similar to the one described as representative of the series, but the average depth to bedrock is 15 to 20 inches. A few stones are on the surface in places, but they average less than 0.1 percent. Slopes are mainly 25 percent.

Included with this soil in mapping were areas of Dibble, Millsholm, San Andreas, Arnold, and Shedd soils and Gaviota sandy loam, 30 to 75 percent slopes. Also included were some areas that have up to 3 percent stones on the surface.

Runoff is rapid, and the erosion hazard is high.

This soil is mostly used for range. Capability unit VIe-1(15); Shallow Coarse Loamy range site.

GdF—Gaviota sandy loam, 30 to 75 percent slopes. This is a steep and very steep soil on mountainous uplands. It has the profile described as representative of the series. Slopes are mostly 45 to 60 percent.

Included with this soil in mapping were areas of Millsholm, San Andreas, Arnold, Reliz, and Shedd soils. Also included were some eroded areas and some areas of Gilroy soils that commonly are on the tops of ridges south of Burma Road and east of Alder Peak on the Hunter Liggett Military Reservation. Areas of a soil that is about 20 percent Rock outcrop and 80 percent a pale brown to brown sandy loam that is less than 10 inches deep to rock were also included.

Runoff is rapid to very rapid, and the erosion hazard is high to very high.

This soil is mostly used for range, watershed, and wildlife habitat. Capability unit VIIe-1(15); Shallow Coarse Loamy range site.

GeE—Gaviota-San Andreas complex, 15 to 30 percent slopes. The soils in this complex are moderately steep. They formed on uplands in material that was derived from sandstone. The soils were too intermingled or too small in extent to be mapped separately at the scale used.

Gaviota soils make up about 30 percent of this complex and San Andreas soils 25 percent. Gaviota soils typically have slopes of 25 to 30 percent, and San Andreas soils typically have slopes of 15 to 25 percent. About 35 percent of the complex consists of areas of Millsholm, Gazos, and Dibble soils; areas that have slopes of more than 30 percent; and areas of a soil that is similar to the Gaviota soil but less than 10 inches deep to bedrock. The rest is rock outcrop.

The San Andreas soil has an available water capacity of 3.5 to 6.5 inches, and roots can penetrate to a depth of 30 to 40 inches. Runoff is rapid, and the erosion hazard is high.

This complex is a site for military manuevers and a military firing range and commonly is burned over several times a year. It is also used for range and wildlife habitat. Capability unit VIe-1(15); Gaviota soil in Shallow Coarse Loamy range site, San Andreas soil in Coarse Loamy range site.

GeG—Gaviota-San Andreas complex, 30 to 75 percent slopes. The soils in this complex are steep and very steep. They formed on mountainous uplands in material that was derived from sandstone. The soils were so intermingled and so small in extent that it was not feasible to map them separately at the scale used.

Gaviota soils make up about 30 percent of this complex and San Andreas soils 30 percent. Gaviota soils typically have slopes of 40 to 75 percent, and San Andreas soils typically have slopes of 30 to 60 percent. Rock outcrops make up about 10 percent, and the rest consists of areas of Arnold, Shedd, and Millsholm soils, areas of a sandy loam that has a subsoil of loam or clay loam, and areas of a pale brown sandy loam that is 20 to 40 inches deep to bedrock.

Runoff is rapid to very rapid, and the erosion hazard is high to very high. The San Andreas soil has an available water capacity of 2 to 6.5 inches, and roots can penetrate to a depth of 20 to 40 inches.

This complex is a site for military manuevers and

is also used for range, wildlife habitat, and watershed. Capability unit VIIe–1(15); Gaviota soil in Shallow Coarse Loamy range site, San Andreas soil in Coarse Loamy range site.

Gazos Series

The Gazos series consists of well drained soils on hills. These soils formed in material underlain by sandstone and shale. Slopes are 15 to 50 percent. The vegetation consists of wild oats, soft chess and other annual grasses, forbs, California sage and other shrubs, and a few scattered oaks. The elevation is 1,000 to 3,000 feet. The mean annual precipitation is 16 to 25 inches, the mean annual air temperature is 57° to 60° F, and the frost-free season is about 300 days. Summers are mainly hot and dry, but they are foggy along the coast, and winters are cool and moist.

In a representative profile the soil is dark grayish brown, slightly acid silt loam about 22 inches thick underlain by brown, slightly acid silty clay loam. Very pale brown weathered sandstone is at a depth of 29 inches.

Permeability is moderate, and the available water capacity is 5 to 8 inches. Roots penetrate to a depth of 20 to 40 inches.

Gazos soils are used mostly for range.

Representative profile of Gazos silt loam, 30 to 50 percent slopes, about 3 miles from San Ardo, 0.7 mile SW on Garrissere Canyon Road from the junction with Paris Valley Road; in SW¼SE¼ sec. 13, T. 22 S., R. 9 E.

A11—0 to 9 inches; dark grayish-brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) when moist; strong medium and coarse angular blocky structure; hard, friable, sticky and plastic; many very fine and fine roots; many very fine and fine and few medium tubular pores; slightly acid; clear wavy boundary.

A12—9 to 22 inches; dark grayish brown (10YR 4/2) heavy silt loam, very dark grayish brown (10YR 3/2) when moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; common very fine roots; many very fine and fine and few medium tubular pores; slightly acid; gradual wavy boundary.

A13—22 to 29 inches; brown (10YR 4/3, 5/3) silty clay loam, dark brown (10YR 3/3) when moist; weak medium subangular blocky structure; hard, friable, sticky and plastic; few very fine roots; many very fine and fine and few medium tubular pores; slightly acid; clear wavy boundary.

Cr—29 to 36 inches; very pale brown (10YR 7/4) weathered sandstone.

The A1 horizon is very dark grayish brown, dark gray, dark grayish brown, brown, gray, or grayish brown. Texture is fine sandy loam, very fine sandy loam, silt loam, loam, clay loam, or silty clay loam. Most areas that are clay loam are in the southeastern part of the county. The content of coarse fragments ranges from a few pebbles to 25 or 30 percent. Small angular pebbles or shale fragments are more common on the Monterey and Franciscan Formations. Reaction ranges from medium acid to neutral. It commonly is slightly acid along the coast and is neutral inland. Structure is crumb, granular, or blocky. An AC horizon, B2 horizon, or C horizon occurs in some profiles. A few thin discontinuous clay films may occur in the lower horizons or along rock fractures. Depth to bedrock ranges from 20 to 40 inches.

GfE—Gazos silt loam, 15 to 30 percent slopes. This is a moderately steep soil on the foot slopes of hills.

Included with this soil in mapping were areas of San Andreas, Santa Lucia, Los Osos, Gilroy, Chamise, Millsholm, San Benito, Lopez, and Reliz soils. Also included were areas of a soil that is similar to this Gazos soil but more than 40 inches deep to bedrock; areas of a soil that has a hard, massive surface layer; and areas that are either somewhat steeper or more gently sloping than this soil. Grayish brown clay loams that have more than 35 percent coarse fragments are included along the coast from near Point Sur to Limekiln Creek.

Runoff is medium, and the erosion hazard is moderate.

This soil is used mainly for range, watershed, and wildlife habitat. Capability unit IVe–1(15); Fine Loamy range site.

GfF—Gazos silt loam, 30 to 50 percent slopes. This is a steep soil on hillsides. It has the profile described as representative of the series.

Included with this soil in mapping were minor soils which make up about 35 percent of the acreage. The most common of these soils are San Andreas, Santa Lucia, Los Osos, and Gilroy soils. The San Andreas soil is commonly in the area between Tularcitos Creek and Corral de Tierra. Also included were areas of Chamise, Millsholm, San Benito, Lopez, and Reliz soils, Xererts-Xerolls complex, and a grayish brown clay loam that has more than 35 percent coarse fragments. Other soils similar to this Gazos soil, but that are more than 40 inches deep to bedrock or have a massive, hard surface layer were also included. In a few areas the soils have slopes of somewhat less than 30 percent or more than 50 percent.

Runoff is rapid, and the erosion hazard is moderate to high.

This soil is used for annual range. Capability unit VIe–1(15); Fine Loamy range site.

Gilroy Series

The Gilroy series consists of well drained soils on uplands. These soils formed in material underlain by metamorphosed igneous rocks. Slopes are 15 to 75 percent. The vegetation is mainly coast live oak, wild oats, annual grasses, forbs, and a few scattered digger pines and junipers. In eroded areas the vegetation consists of California sage, black sage, yucca, coast live oak, laurel, Coulter pine, digger pine, and annual and some perennial grasses. The elevation is 500 to 3,500 feet. The mean annual precipitation is 16 to 45 inches, the mean annual air temperature is about 58° F, and the frost-free season is 150 to 270 days. Summers are hot and dry, except along the coast where they are warm and foggy, and winters are cool and moist.

In a representative profile the surface layer is brown, slightly acid gravelly loam about 11 inches thick. The subsoil is reddish brown, slightly acid gravelly clay loam about 14 inches thick. Hard, shattered igneous rock is at a depth of 25 inches.

Permeability is moderate.

Gilroy soils are used for range, wildlife habitat, and watershed.

Representative profile of Gilroy gravelly loam, 15 to 50 percent slopes, about 300 feet SW of the intersection of North Fork Road and State Highway 198 in Priest Valley; SE¼NE¼ sec. 18, T. 20 S., R. 12 E.

A1—0 to 11 inches; brown (7.5YR 5/4) gravelly loam, dark brown (7.5YR 3/2) when moist; moderate medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine interstitial pores and few very fine tubular pores; 20 percent gravel ¼ inch to 3 inches in diameter; slightly acid; clear wavy boundary.

B2t—11 to 25 inches; reddish brown (5YR 4/4) gravelly clay loam, dark reddish brown (5YR 3/3) when moist; weak medium subangular blocky structure; hard, friable, sticky and plastic; common very fine and fine roots; common very fine interstitial pores and common very fine and few fine tubular pores; common thin clay films on faces of peds and lining pores; 15 percent gravel ¼ inch to 3 inches in diameter and 5 percent cobblestones; slightly acid; clear wavy boundary.

IIR—25 to 30 inches; hard metamorphosed igneous rock, shattered in the upper few inches; small amount of soil between rock fractures.

The A1 horizon ranges from reddish brown to dark brown or brown. Texture commonly is gravelly loam, but ranges to gravelly clay loam in places. Most areas contain about 15 to 30 percent angular gravel ¼ inch to 3 inches in diameter. A few scattered rock outcrops occur on 1 to 2 percent of the acreage. Reaction is slightly acid or neutral. An A3 or B1t horizon occurs in some places.

The Bt horizon is reddish brown, brown, strong brown, or dark brown. Texture typically is gravelly clay loam, but it is gravelly loam in places. The content of coarse fragments is about 15 to 30 percent gravel ¼ inch to 3 inches in diameter and about 5 percent angular rock fragments 3 to 10 inches in diameter. Reaction is slightly acid to mildly alkaline.

About 40 percent of this soil has a C horizon that is 25 to 30 percent soil material and 70 to 75 percent rock fragments. Depth to hard rock typically is about 25 inches, but ranges from 20 to 36 inches.

GgE—Gilroy gravelly loam, 15 to 50 percent slopes. This is a moderately steep to steep soil on uplands. It has the profile described as representative of the series. Slopes are mostly about 35 percent.

Included with this soil in mapping were areas of a soil that has about 50 percent coarse fragments in the surface layer and subsoil; areas of Los Osos, Montara, Climara, Henneke, Los Gatos, and Millsholm soils; and, along the Parkfield-Coalinga Road, areas of a soil that has a surface layer of reddish brown, neutral gravelly clay loam and a subsoil of red, slightly acid gravelly clay. Also included were small areas of rock land, moderately eroded areas, and small areas of landslips. McCoy gravelly loam, very stony subsoil variant, is part of this mapping unit along the coast. Included about 2 miles east of the junction of Cachagua and Jamesberg-Arroyo Seco Roads, near the center of section 4, T. 18 S., R. 4 E. on the Hasting Natural History Reservation, were areas of a reddish brown and dark reddish brown soil that was derived from andesite. The surface layer is slightly acid and neutral loam, and the subsoil is slightly acid and medium acid clay loam or clay. The soil commonly has stones or rocks on the surface and rock fragments throughout the soil.

Roots can penetrate to a depth of 20 to 36 inches, and the available water capacity is 3 to 7 inches. Runoff is rapid, and the erosion hazard is high.

This soil is used for range, wildlife habitat, and watershed. Capability unit VIIe–1(15); Coarse Loamy range site.

GgG2—Gilroy gravelly loam, 30 to 75 percent slopes, eroded. This is a steep and very steep soil on ridges or on uplands that have mainly southern exposures. The vegetation consists of California sage, black sage, yucca, coast live oak, laurel, Coulter pine, digger pine, and annual and some perennial grasses. In some places only one species of vegetation is dominant. The surface layer has been eroded and the subsoil exposed in some areas. A few small gullies are on the steeper slopes. The bedrock consists mostly of metamorphosed sandstone and shale and Franciscan volcanics and metavolcanics. Rock outcrops cover 3 to 5 percent of the surface and as much as 20 percent in some places.

Areas included with this soil in mapping make up about 35 percent of the acreage. Los Gatos soils make up about 10 percent, Henneke soils make up 5 percent, and a brown, reddish brown, or dark reddish brown soil that has more than 35 percent rock fragments in the subsoil makes up about 15 percent. Also included were small areas of Gilroy gravelly loam, 15 to 50 percent slopes, and Millsholm, Los Osos, and McCoy soils. Some areas that have slopes of as much as 90 percent or areas of dark grayish brown clay loams that are less than 20 inches deep to bedrock were also included.

Runoff is rapid or very rapid, and the erosion hazard is high or very high. Roots can penetrate to a depth of 20 to 30 inches. The available water capacity is 3 to 5 inches.

This soil is used for wildlife habitat, watershed, and recreation. A few areas are used for grazing. Capability unit VIIe–1(15); Coarse Loamy range site.

Gloria Series

The Gloria series consists of well drained and moderately well drained soils that formed in granitic alluvium on fanlike benches, terraces, and alluvial fans. Some of these areas are deeply dissected by drainageways. Slopes are 2 to 50 percent. The vegetation consists of annual grasses and forbs. The elevation is 100 to 2,000 feet. The mean annual precipitation is 10 to 15 inches, the mean annual air temperature is 57° to 60° F, and the frost-free season is about 250 days. Summers are warm and dry, except in the northern Salinas Valley where they are often foggy, and winters are cool and moist.

In a representative profile the surface layer is brown, medium acid and slightly acid sandy loam about 15 inches thick. The subsurface layer is very pale brown, neutral sandy loam 1 inch thick. The subsoil is reddish brown, mildly alkaline clay 7 inches thick. The substratum is reddish brown and strong brown, moderately alkaline, strongly indurated hardpan that extends to a depth of more than 60 inches.

Permeability is very slow.

Gloria soils are used for dryland pasture, range, and grain and for irrigated row crops, field crops, forage crops, and strawberries as a specialty crop.

Representative profile of Gloria sandy loam, 2 to 9 percent slopes, about 4 miles east of Gonzales; 1,600 feet SW from the intersection of Camphora-Gloria Road; on Gloria Road on NW band of road cut about 16 yards west into field near the center of SE¼NW¼ SE¼ sec. 25, T. 16 S., R. 5 E.

Ap—0 to 8 inches; brown (10YR 5/3) sandy loam, dark yellowish brown (10YR 3/4) when moist; weak medium subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; common

very fine roots; many very fine interstitial pores; 10 percent pebbles; 15 percent rodent holes filled with soil material that has strong granular structure; medium acid; gradual smooth boundary.

A12—8 to 15 inches; brown (7.5YR 5/4) sandy loam, reddish brown (5YR 4/4) when moist; massive; hard, very friable, sticky and plastic; common very fine roots; many very fine interstitial pores and common very fine and fine tubular pores; 10 percent pebbles; small thin areas of A2 material in lower part; slightly acid; clear smooth boundary.

A2—15 to 16 inches; very pale brown (10YR 7/3) sandy loam, brown (7.5YR 5/4) when moist; weak medium platy structure; hard, very friable, sticky and plastic; common very fine roots; few very fine interstitial pores and common very fine and fine tubular pores; 10 percent pebbles; neutral; abrupt smooth boundary.

B2t—16 to 23 inches; reddish brown (5YR 4/4, moist and dry) clay; dark brown (7.5YR 3/2, moist and dry) coatings on the top and upper sides of peds and some veins and blotches of olive yellow (2.5Y 6/6) in the middle and lower part; strong coarse prismatic structure; extremely hard, very firm, very sticky and plastic; common very fine roots on exteriors of peds; common very fine tubular pores; continuous thin clay films and few moderately thick films on faces of peds; 15 percent pebbles; mildly alkaline; abrupt smooth boundary.

C1sim—23 to 41 inches; reddish brown (5YR 5/4) indurated hardpan, reddish brown (2.5YR 4/4) when moist; massive; does not soften or slake upon wetting and is chipped with hard tools with extreme difficulty; common very fine tubular pores; few moderately thick clay films lining pores and continuous thin films bridging grains; matrix mostly noncalcareous; very slightly calcareous with lime as filaments in some veins, in parts of the pit ⅛-inch lime seams occur on top of indurated pan, but not in area sampled; light brownish gray (2.5Y 6/2) generally vertical veins, ¼ to ¾ inch thick, make up about 5 to 10 percent of the soil and appear to be silica and clay; this horizon becomes more yellow with depth; moderately alkaline; boundary indeterminate.

C2sim—41 to 69 inches; strong brown (7.5YR 5/6) strongly cemented hardpan, light yellowish brown (10YR 6/4) when dry; massive; does not slake or soften upon wetting; common very fine tubular pores; this horizon examined by auger with great difficulty; contains few black 1 to 2 millimeter stains.

The A1 horizon is brown or grayish brown, and texture is loam or sandy loam that is gravelly in places. Reaction ranges from strongly acid to neutral. The A2 horizon ranges from ⅛-inch thick cappings on the B2t horizon to 1 to 8 inches thick. It is very pale brown to light brownish gray and pinkish gray, and texture ranges from loam to gravelly sandy loam. Reaction ranges from medium acid to neutral.

The B2t horizon is variable. It is commonly light gray to dark red, but in places ranges from dark reddish brown to yellowish red and from dark brown to yellowish brown. Texture is light clay, clay, sandy clay, or heavy clay loam. Thickness of the B2t ranges from 3 to 24 inches, but is commonly 4 to 10 inches. The B2t horizon ranges from medium acid to moderately alkaline and commonly is noncalcareous.

The Csim horizon, or duripan, ranges from light yellowish brown, grayish brown, brown, and pale brown to yellowish red and dark red. The duripan is not always glazed at the top but has an abrupt upper boundary. Reaction ranges from neutral to moderately alkaline with lime seams in some profiles. Where the solum is thicker, the duripan may be more weakly expressed, but there are no consistent relationships between depth to pan and hardness or degree of cementation of pan. Silica is the main cementing agent. Depth to the duripan is always less than 40 inches.

GhC—Gloria sandy loam, 2 to 9 percent slopes. This is a gently sloping to moderately sloping soil on fanlike benches and terraces. It has the profile described as representative of the series. Slopes are mostly 3 to 6 percent.

Included with this soil in mapping were areas of Placentia, Chualar, and Antioch soils; some areas, mostly in swales or concave positions, where indurated layers are below a depth of 40 inches or are weakly expressed; and some areas of soils that do not have an abrupt boundary between the surface layer and subsoil. Areas of Gloria sandy loam, 9 to 15 percent slopes, and a few moderately eroded areas were also included.

This soil is moderately well drained. Runoff is slow or medium, and the erosion hazard is slight or moderate. Roots can penetrate to a depth of less than 40 inches. The available water capacity is 3 to 6 inches.

This soil is used for irrigated crops and such specialty crops as strawberries, for pasture and dryland grain, and for hay and annual pasture. Capability unit IIIe-3(14); Claypan range site.

GhD—Gloria sandy loam, 9 to 15 percent slopes. This is a strongly sloping soil on fanlike benches and terraces. It has a profile similar to the one described as representative of the series, but the surface layer is 10 to 24 inches thick and the subsoil is 4 to 15 inches thick. Slopes are mostly about 11 percent.

Included with this soil in mapping were small areas of Chualar and Placentia soils, Gloria sandy loam, 2 to 9 percent slopes, and Gloria sandy loam, 15 to 50 percent slopes. Also included were soils that have a surface layer of sandy loam or sandy clay loam that is underlain by an indurated substratum and a few small areas that are severely eroded.

This soil is well drained. Runoff is medium, and the erosion hazard is moderate. Roots can penetrate to a depth of less than 40 inches. The available water capacity is 2 to 5 inches.

This soil is used mostly for dryland pasture and range. It is also used for dryland grain and hay. Capability units IVe-3(14), IVe-3(15); Claypan range site.

GhF—Gloria sandy loam, 15 to 50 percent slopes. This is a moderately steep and steep soil on dissected terraces. It has a profile similar to the one described as representative of the series, but the surface layer, which ranges from 8 to 20 inches in thickness, is commonly only 8 to 12 inches thick and the subsoil is 3 to 14 inches thick. This soil occurs more commonly with associated upland soils than with the other Gloria soils. Slopes are mostly 25 to 30 percent.

Included with this soil in mapping were small areas of Placentia, Sheridan, Vista, Arroyo Seco, and Elder soils and Gloria sandy loam, 9 to 15 percent slopes. Also included were areas that lack a clay subsoil and an indurated substratum; some areas that have been severely eroded and severely gullied; and some places where rocklike indurated cappings are on slope breaks, on tops of terraces, and on from 2 to 5 percent of the surface in many areas. A few deeply incised drainageways make up part of this mapping unit in swales.

This soil is well drained. Runoff is rapid, and the erosion hazard is high. Roots can penetrate to a depth of less than 40 inches. The available water capacity is 1.5 to 4 inches.

This soil is used mainly for range. A few small areas

are used for annual grain and hay. Capability unit VIIe–1(15); Claypan range site.

Gorgonio Series

The Gorgonio series consists of somewhat excessively drained soils on alluvial fans and in mountain valleys. These soils formed in alluvium derived from granitic and schistose rocks. Slopes are 0 to 5 percent. The vegetation consists of annual grasses, forbs, and scattered oaks. The elevation is 20 to 2,000 feet. The mean annual precipitation is 15 to 25 inches, the mean annual air temperature is 57° to 60° F, and the frost-free season is about 250 days. Summers are hot and dry, and winters are cool and moist.

In a representative profile the surface layer is dark grayish brown and grayish brown, slightly acid and neutral sandy loam and coarse sandy loam about 22 inches thick. Below this is grayish brown, neutral loamy sand 13 inches thick. The underlying material is brown and pale brown, neutral fine gravelly loamy sand that extends to a depth of more than 60 inches.

Permeability is rapid, and the available water capacity is 3.5 to 5 inches. Roots penetrate to a depth of more than 60 inches.

Gorgonio soils are used for pasture, dryland grain, or grain hay.

Representative profile of Gorgonio sandy loam, 0 to 5 percent slopes, near Tularcitos Road about midway between the Tularcitos Ranch headquarters and Rana Creek; about 200 feet west of a windmill, 135 feet south of Tularcitos Creek, and 72 feet north and 15 feet east of a large oak.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) when moist; massive; slightly hard, friable, nonsticky and nonplastic; many very fine and few fine roots; many very fine tubular and interstitial pores; about 10 percent fine angular gravel; slightly acid; clear wavy boundary.

A12—7 to 22 inches; grayish brown (10YR 5/2) coarse sandy loam, very dark grayish brown (10YR 3/2) when moist; massive; slightly hard, friable, nonsticky and nonplastic; common very fine roots; common very fine tubular and interstitial pores; neutral; clear smooth boundary.

AC—22 to 35 inches; grayish brown (10YR 5/2) loamy sand, dark brown (10YR 3/3) when moist; massive; soft, very friable, nonsticky and nonplastic; common very fine roots; common very fine tubular and interstitial pores; neutral; gradual wavy boundary.

C1—35 to 48 inches; brown (10YR 5/3) fine gravelly loamy sand, dark grayish brown (10YR 4/2) when moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; common very fine tubular and interstitial pores; 15 percent fine angular gravel; neutral; diffuse smooth boundary.

C2—48 to 63 inches; pale brown (10YR 6/3) fine gravelly loamy sand, brown (10YR 4/3) when moist; massive; soft, very friable, nonsticky and nonplastic; very few very fine roots; common very fine tubular and interstitial pores; 20 percent fine angular gravel; neutral.

The Ap and A12 horizons are fine gravelly sandy loam, gravelly sandy loam, sandy loam, or coarse sandy loam. Coarse fragments commonly are less than ½ inch in size, and they make up 10 to 30 percent of the horizon. Reaction ranges from medium acid to neutral. The C horizon is brown, grayish brown, light brownish gray, light gray, or pale brown. The soil is never calcareous and commonly is stratified with layers of loam, sandy loam, loamy sand, or sand.

GkB—Gorgonio sandy loam, 0 to 5 percent slopes. This is a level to gently sloping soil on valley floors. It has the profile described as representative of the series. Slopes are mostly 2 to 4 percent.

Included with this soil in mapping were areas of Elder soils making up 5 percent of the acreage, areas of Arroyo Seco soils making up 15 percent, and small areas of Fluvents, stony and Hanford, Salinas, and Tujunga soils.

Runoff is slow, and the erosion hazard is slight.

This soil is mostly used for pasture and dryland grain or for grain hay. Capability unit IIIs–4(14), IIIs–4(15); range site not assigned.

Greenfield Series

The Greenfield series consists of well drained soils that formed in alluvium derived from sedimentary rocks on alluvial fans and terraces. Slopes are 2 to 15 percent. The vegetation consists of annual grasses and forbs and a few scattered oaks. The elevation is 300 to 2,000 feet. The mean annual precipitation is 10 to 16 inches, the mean annual air temperature is about 60° F, and the frost-free season is about 250 days. Summers are hot and dry, and winters are cool and moist.

In a representative profile the upper 13 inches of the surface layer is light brownish gray, slightly acid fine sandy loam. The lower 9 inches is grayish brown, neutral sandy loam. The subsoil is brown and pale brown, neutral and mildly alkaline heavy sandy loam and sandy loam 30 inches thick. The substratum is pale brown, moderately alkaline fine sand that extends to a depth of more than 60 inches.

Permeability is moderately rapid, and the available water capacity is 6 to 8 inches. Roots penetrate to a depth of more than 60 inches.

Greenfield soils are used mostly for dryland grain. Many new areas are being irrigated and planted to field and row crops and to pasture.

Representative profile of Greenfield fine sandy loam, 2 to 5 percent slopes, about 4 miles south of San Lucas; about 2,100 feet SW on Espinosa Canyon Road from Paris Valley Road, then 2,000 feet NW into field from Espinosa Canyon Road and about 120 feet into the second field.

Ap1—0 to 10 inches; light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) when moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine roots; slightly acid; abrupt smooth boundary.

Ap2—10 to 13 inches; light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) when moist; massive (tillage pan); hard, firm, slightly sticky and slightly plastic; common very fine roots; few very fine tubular pores; slightly acid; clear smooth boundary.

A3—13 to 22 inches; grayish brown (10YR 5/2) sandy loam, dark grayish brown (10YR 4/2) when moist; moderate coarse subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common very fine roots; common very fine and few fine and medium tubular pores; neutral; gradual smooth boundary.

B21t—22 to 31 inches; brown (10YR 5/3) heavy sandy loam, brown (10YR 4/3) when moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; common very fine roots; com-

mon very fine and few fine and medium tubular pores; common thin clay films lining pores and few thin clay films on faces of peds; neutral; gradual smooth boundary.

B22t—31 to 44 inches; pale brown (10YR 6/3) heavy sandy loam, dark yellowish brown (10YR 4/4) when moist; moderate medium prismatic structure; very hard, firm, sticky and plastic; common very fine roots; common very fine tubular pores; common moderately thick clay films on faces of peds and lining pores; neutral; gradual smooth boundary.

B3t—44 to 52 inches; pale brown (10YR 6/3) sandy loam, yellowish brown (10YR 5/4) when moist; massive; very hard, firm, sticky and plastic; very few very fine roots; few very fine tubular pores; few thin clay films lining pores and bridging mineral grains; mildly alkaline; gradual wavy boundary.

C—52 to 64 inches; pale brown (10YR 6/3) fine sand, yellowish brown (10YR 5/4) when moist; massive; soft, very friable, nonsticky and nonplastic; no roots observed; a few thin clay films bridging grains in thin bands; moderately alkaline.

The A horizon is grayish brown, pale brown, or light brownish gray, and it commonly is dark brown or dark grayish brown when moist. Texture typically is fine sandy loam but ranges to sandy loam or loam in places. Reaction ranges from slightly acid to mildly alkaline. Some places do not have an A3 horizon.

The Bt horizon is brown to light yellowish brown, and texture is loam or heavy sandy loam. Reaction ranges from neutral to moderately alkaline.

The C horizon is pale brown, light yellowish brown, or very pale brown, and texture is stratified loamy fine sand to sand. Reaction ranges from mildly alkaline to moderately alkaline. In places, unrelated alluvium or soft sandstone is below a depth of 60 inches.

GmB—Greenfield fine sandy loam, 2 to 5 percent slopes. This is a gently sloping soil on fans and terraces. It has the profile described as representative of the series. Slopes are mostly 3 percent.

Included with this soil in mapping were small areas of Snelling, Lockwood, Garey, and Oceano soils. Also included, and making up about 10 percent of the acreage, was a soil similar to this Greenfield soil but that has a dark grayish brown surface layer that is structured rather than massive.

Runoff is slow, and the erosion hazard is slight.

This soil is used for irrigated field and row crops and dryland grain. Capability unit IIe-1(14); range site not assigned.

GmC—Greenfield fine sandy loam, 5 to 9 percent slopes. This is a gently rolling soil on fans and terraces. Slopes are mostly 7 percent.

Included with this soil in mapping were small areas of Snelling, Lockwood, Garey, Oceano, and Rincon soils. Also included, and making up about 15 percent of the acreage, was a soil that has a grayish brown surface layer and subangular blocky structure. A few moderately eroded areas were also included.

Runoff is medium, and the erosion hazard is moderate.

This soil is used for dryland grain and range. Capability unit IIe-1(14); range site not assigned.

GmD—Greenfield fine sandy loam, 9 to 15 percent slopes. This is a rolling soil on dissected terraces. It has a profile similar to the one described as representative of the series, but the surface layer is typically about 18 inches thick.

Included with this soil in mapping were small areas of Snelling, Lockwood, Garey, Oceano, and Rincon soils. Also included, and making up 15 percent of the acreage, was a soil that is similar to this Greenfield soil, but has a grayish brown surface layer and subangular blocky structure. A few severely eroded areas were also included.

Runoff is medium, and the erosion hazard is moderate.

This soil is used for dryland grain and range. Capability unit IIIe-1(14); range site not assigned.

Haire Series

The Haire series consists of moderately well drained soils on uplands. These soils formed in material underlain by granodiorite and arkosic sandstone. Slopes are 15 to 30 percent. The vegetation consists of oaks, annual grasses and forbs, and poison-oak. The elevation is 200 to 2,400 feet. The mean annual precipitation is 20 to 30 inches, the mean annual air temperature is about 58° F, and the frost-free season is 200 to 300 days. Summers are hot and dry, except along the coast where they are warm and foggy, and winters are cool and moist.

In a representative profile the surface layer is gray, neutral and slightly acid loam about 11 inches thick. The upper 9 inches of the subsoil is grayish brown, very strongly acid clay, and the lower 5 inches is pale brown, very strongly acid sandy clay loam. At a depth of 25 inches is very pale brown, very strongly acid weathered granodiorite that crushes to sandy clay loam. At a depth of 41 inches is white, very strongly acid, weathered granodiorite that crushes to sandy loam.

Permeability is very slow, and the available water capacity is 1.5 to 3 inches. Roots penetrate to a depth of 20 to 30 inches.

Haire soils are used mostly for annual range.

Representative profile of Haire loam, 15 to 30 percent slopes, about 4 miles SE of Carmel Valley Village. The site is about 1.55 miles up Cachagua Grade Road from Tularcitos Road, 130 feet west and 190 feet south of road cuts on Cachagua Grade; about 50 feet north of the fence that is the boundary of the Los Tularcitos Land Grant, near the center of sec. 19, T. 17 S., R. 3 E. (projected).

A11—0 to 5 inches; gray (10YR 5/1) loam, very dark gray (10YR 3/1) when moist; moderate medium and fine granular structure; slightly hard, friable, slightly sticky and nonplastic; many very fine roots; many very fine and fine interstitial pores; neutral; clear smooth boundary.

A12—5 to 11 inches; gray (10YR 5/1) loam, very dark gray (10YR 3/1) when moist; weak coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine and fine interstitial and tubular pores; slightly acid; abrupt smooth boundary.

B2t—11 to 20 inches; grayish brown (10YR 5/2) clay, dark grayish brown (10YR 4/2) when moist; strong medium columnar structure; thin, light gray (10YR 6/1) coatings on top of columns; extremely hard, very firm, very sticky and very plastic; common medium and coarse and many fine roots; many very fine and fine interstitial and tubular pores; continuous moderately thick clay films on faces of peds and lining pores; very strongly acid; clear wavy boundary.

B3t—20 to 25 inches; pale brown (10YR 6/3) heavy sandy clay loam; brown (10YR 5/3) when moist; weak coarse subangular blocky structure; very hard, fri-

able, sticky and plastic; few medium and coarse and common very fine roots; common fine interstitial pores; common thin clay films lining pores and few thin clay films bridging grains and on faces of peds; 15 percent fine angular gravel; very strongly acid; clear wavy boundary.

C1—25 to 41 inches; very pale brown (10YR 7/3) strongly weathered granodiorite that crushes to sandy clay loam, pale brown (10YR 6/3) when moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots; common fine interstitial pores; few thin clay films lining pores; very strongly acid; gradual irregular boundary.

C2r—41 to 60 inches; light yellowish brown (2.5Y 6/4) when moist; white (2.5Y 8/2) weathered granodiorite that crushes to sandy loam; massive; very strongly acid.

The A1 horizon is dark gray, dark grayish brown, gray, or grayish brown, and texture is loam or gravelly loam. Reaction ranges from neutral to medium acid. The B2t horizon is dark grayish brown, grayish brown, brown, pale brown, light brownish gray, or olive, and texture is clay or sandy clay. Structure is columnar, prismatic, or blocky. Reaction is strongly acid or very strongly acid. There is no B3 horizon in some places. The C1 horizon is strongly acid or very strongly acid weathered granodiorite or arkosic sandstone that occurs at a depth of 20 to 30 inches.

HaE—Haire loam, 15 to 30 percent slopes. This is a moderately steep to steep soil on uplands. Slopes are mostly 15 to 20 percent.

Included with this soil in mapping were small areas of Los Osos, Sheridan, Santa Ynez, Gazos, McCoy, Gilroy, and Dibble soils. Also included were some soils that are very similar to Haire soils but have a slightly acid or medium acid subsoil. A few areas that have slopes of less than 15 percent were also included.

Runoff is medium to rapid, and the erosion hazard is moderate to high.

This soil is used mostly for annual range. Capability unit VIe-1(15); Claypan range site.

Hanford Series

The Hanford series consists of well drained soils that formed in alluvium derived from granitic rocks on alluvial fans and flood plains. Slopes are 0 to 5 percent. The vegetation consists of annual grasses and forbs and scattered oaks. The elevation is 300 to 1,000 feet. The mean annual precipitation is 10 to 12 inches, the mean annual air temperature is about 58° F, and the frost-free season is about 250 days. Summers are warm and dry, except in the northern Salinas Valley where they are foggy, and winters are cool and moist.

In a representative profile the surface layer is grayish brown, slightly acid and mildly alkaline gravelly sandy loam and gravelly loam about 33 inches thick. The underlying material is grayish brown and pale brown, neutral gravelly loamy coarse sand extending to a depth of more than 60 inches.

Permeability is moderately rapid, and the available water capacity is 5 to 7 inches. Roots penetrate to a depth of more than 60 inches.

Hanford soils are used mostly for dryland grain and range.

Representative profile of Hanford gravelly sandy loam, 0 to 5 percent slopes, about 5 miles east of Gonzales on Gloria Road; 62 feet south of Gloria Road in east 1/4 corner of SE1/4NE1/4 sec. 30, T. 16 S., R. 6 E.

A11—0 to 7 inches; grayish brown (10YR 5/2) gravelly sandy loam, dark grayish brown (10YR 4/2) when moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine interstitial pores; 30 percent fine angular gravel; slightly acid; abrupt smooth boundary.

A12—7 to 33 inches; grayish brown (10YR 5/2) gravelly loam, dark grayish brown (10YR 4/2) when moist; massive; slightly hard, friable, nonsticky and nonplastic; common very fine roots; many very fine interstitial pores; 30 percent fine angular gravel, mildly alkaline; clear wavy boundary.

IIC1—33 to 43 inches; grayish brown (10YR 5/2) gravelly loamy coarse sand, dark grayish brown (10YR 4/2) when moist; massive; soft, very friable, slightly sticky and slightly plastic; common very fine roots; many very fine interstitial pores; 30 percent fine angular gravel; neutral; clear smooth boundary.

IIC2—43 to 70 inches; pale brown (10YR 6/3) stratified gravelly loamy coarse sand, dark yellowish brown (10YR 4/4) when moist; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores; 30 percent fine angular gravel; neutral.

The A1 horizon is pale brown, grayish brown, or light brownish gray, and texture is gravelly sandy loam, gravelly loam, or sandy loam. The content of fine gravel (2 to 5 millimeters) ranges from 20 to 30 percent. The IIC horizon is grayish brown, pale brown, or light yellowish brown. The texture ranges from sandy loam to loamy sand and sand that is gravelly in places. Depth to the IIC horizon ranges from 30 to 40 inches.

HbB—Hanford gravelly sandy loam, 0 to 5 percent slopes. This is a nearly level to undulating soil on fans and flood plains in narrow valleys. Slopes are mostly 2 percent.

Included with this soil in mapping were areas of Tujunga soils that make up about 10 percent of the acreage and small areas of Arroyo Seco, Elder, Metz, and Danville soils.

Runoff is slow, and the erosion hazard is slight.

This soil is used mostly for dryland grain and range. Capability units IIs-4(14), IIIs-4(15); range site not assigned.

Henneke Series

The Henneke series consists of excessively drained soils that formed on uplands in material weathered from hard fractured serpentine and peridotite. Slopes are 15 to 75 percent. The vegetation consists of manzanita, leather oak, cypress, digger pine, toyon, and thickets of brush, forbs, and annual grasses. The elevation is 1,000 to 3,000 feet. The mean annual precipitation is 20 to 45 inches, the mean annual air temperature ranges from 58° to 63° F, and the frost-free season is about 200 days. Summers are hot and dry, and winters are cool and moist.

In a representative profile the surface layer is dark reddish brown, neutral clay loam about 3 inches thick. The upper 6 inches of the subsoil is dark reddish gray, neutral clay loam, and the lower part of the subsoil is dark reddish brown, neutral cobbly clay. Hard fractured serpentine is at a depth of 15 inches.

Permeability is moderately slow, and the available water capacity is 1 to 2 inches. Roots penetrate to a depth of 13 to 17 inches.

Henneke soils are mostly used for range, wildlife habitat, recreation, and watershed.

Representative profile of Henneke extremely stony

clay loam, 15 to 75 percent slopes, about 2 miles north of the San Luis Obispo County Line and about 1.3 miles east from Little Salmon Creek; in SW¼SW¼ sec. 21, T. 24 S., R. 7 E.; about 60 feet west from jeep trail leading to Three Peaks.

O1—1½ inches to 0; litter of manzanita leaves, stems, and twigs; strongly acid; abrupt wavy boundary.

A1—0 to 3 inches; dark reddish brown (2.5YR 2/4) extremely stony clay loam, dark reddish brown (5YR 3/3) when moist; moderate fine and medium granular structure; slightly hard and hard, very friable, sticky and plastic; common very fine and fine and few medium roots; many very fine and fine interstitial pores; 20 percent gravel, cobblestones, and stones; neutral; clear wavy boundary.

B1t—3 to 9 inches; dark reddish gray (5YR 4/2) stony heavy clay loam, dark reddish brown (5YR 3/3) when moist; moderate fine and medium granular structure and medium subangular blocky structure; slightly hard and hard, friable, sticky and plastic; common fine and very fine and many medium roots; many very fine interstitial and tubular pores; common thin clay films on faces of peds and lining pores; 20 percent cobblestones and stones; neutral; clear wavy boundary.

B2t—9 to 15 inches; dark reddish brown (5YR 3/2) cobbly clay, dark brown (7.5YR 4/2) when moist; strong medium and coarse angular blocky structure; extremely hard, firm, very sticky and very plastic; few very fine and fine, many medium, and very few coarse roots; few very fine tubular pores; many thin and moderately thick clay films on faces of peds and lining pores; 40 percent gravel, cobblestones, and stones; neutral; clear wavy boundary.

R—15 to 22 inches; fractured serpentine becoming less weathered and more nearly massive with depth; rock fractures filled with soil material from above; very few fine, common medium, and few coarse roots in upper 3 inches grading to very few fine and few medium and coarse roots with depth in the fractures; mildly alkaline.

The A1 horizon is dark reddish brown, dark reddish gray, reddish brown, dark brown, or brown. Texture is generally loam or clay loam that has 20 to 25 percent pebbles, stones, and cobblestones. Reaction ranges from medium acid to moderately alkaline.

The B2t horizon ranges from dark reddish brown to reddish brown. Texture ranges from cobbly or stony heavy clay loam to clay that has 35 to 55 percent gravel, cobblestones, and stones. Structure is angular, subangular blocky, or prismatic. Reaction ranges from neutral to moderately alkaline. Depth to bedrock ranges from 13 to 17 inches.

HcF—Henneke extremely stony clay loam, 15 to 75 percent slopes. This is a moderately steep to very steep soil on uplands. Rock outcrops, boulders, stones, and cobblestones cover about 5 to 25 percent of the surface. Slopes are mostly about 35 percent.

Included with this soil in mapping were areas of Montara soils making up about 10 percent of the acreage; areas of Rock outcrop making up 15 percent; and areas of a soil that is similar to this Henneke soil, but that is 20 to 30 inches deep to bedrock, making up about 30 percent. Small areas of Gilroy, Climara, McMullin, Los Gatos, and Gaviota soils also were included. Some included soils have a surface layer of deep loam and have either no subsoil or have a subsoil of clay that is less than 35 percent coarse fragments.

Runoff is rapid to very rapid, and the erosion hazard is high to very high.

This soil is used for range, wildlife habitat, recreation, and watershed. Capability unit VIIs-1(15); Serpentine range site.

Junipero Series

The Junipero series consists of well drained soils on mountains. These soils formed in material underlain by granitic and schistose bedrock. Slopes are 30 to 85 percent. The vegetation consists mainly of a dense cover of oak and madrone; yellow, sugar, ponderosa, and Coulter pines; manzanita; poison-oak; and ferns. The elevation is 200 to 5,800 feet. The mean annual precipitation is 30 to 80 inches, the mean annual air temperature is 45° to 55° F, and the frost-free season is 200 to 300 days. Summers are warm and dry, and winters are cool, moist, and sometimes snowy.

In a representative profile the soil is 30 inches thick. It is dark grayish brown, slightly acid sandy loam and brown, medium acid gravelly sandy loam. It is underlain by yellowish brown weathered schist.

Permeability is moderately rapid, and the available water capacity is 3 to 5 inches. Roots penetrate to a depth of 20 to 40 inches.

Junipero soils are used mostly for watershed, recreation, and wildlife habitat. They have potential for limited use as range.

Representative profile of Junipero sandy loam, 30 to 75 percent slopes, about 1 mile NW of Chews Ridge Lookout, 0.8 mile north of Chews Ridge Road from the road leading to the Lookout, or 0.5 mile south from the Forest Service White Oak Campground; near eastern ¼ corner sec. 31, T. 18 S., R. 4 E.

O1—2 inches to 0; dried leaves, twigs, and bark litter.

A11—0 to 5 inches; dark grayish brown (10YR 4/2) sandy loam, very dark gray (10YR 3/1) when moist; moderate fine and medium crumb structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine interstitial pores; 10 percent angular gravel; slightly acid; clear wavy boundary.

A12—5 to 15 inches; dark grayish brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) when moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine, common medium, and few coarse roots; many very fine interstitial pores; 10 percent gravel; slightly acid; gradual wavy boundary.

A13—15 to 30 inches; brown (10YR 4/3) gravelly sandy loam, very dark grayish brown (10YR 3/2) when moist; massive; soft, very friable, nonsticky and nonplastic; common very fine, fine, medium, and coarse roots; common very fine interstitial pores; 25 percent angular gravel and cobblestones; medium acid; clear wavy boundary.

Cr—30 to 40 inches; weathered yellowish brown (10YR 5/4) quartz-mica schist; rock structure weakly evident; about 65 percent of material readily crushes to gravelly sandy loam; common very fine, medium and coarse roots, some roots concentrated in cleavage plains and fractures; medium acid.

Depth to weathered granitic, schistose, or sandstone rock is 20 to 40 inches. The soil contains 5 to 35 percent fine angular gravel. The A1 horizon ranges from very dark gray to brown, black to dark brown when moist. Texture is sandy loam, fine sandy loam, or loam that is gravelly or stony in places. Reaction is strongly acid to neutral. The weathered rock is slightly acid to strongly acid and typically is easily crushed to gravelly sandy loam or gravelly loam. The weathered bedrock grades to unweathered rock at a depth of 2 to 8 feet.

JaF—Junipero loamy sand, 30 to 50 percent slopes. This is a steep soil on mountains within the Los Padres

National Forest and the Ventana Wilderness. The vegetation typically consists of yellow pine, Coulter pine, sugar pine, madrone, and some blue or black oak (fig. 4). The elevation is 2,300 to 5,800 feet. Slopes are mostly about 40 percent.

Included with this soil in mapping, and making up about 40 percent of the acreage, were areas of Junipero sandy loam, 30 to 75 percent slopes, or similar sandy loams or sands that have more than 35 percent coarse fragments or that are less than 20 inches deep. Soils that have a sandy texture throughout the profile make up part of this mapping unit in the Junipero Serra Peak area.

Runoff is medium, and the erosion hazard is high.

This soil is used for recreation, wildlife habitat, and watershed. It has moderately high productivity for ponderosa pine (the site index averages about 90). The seedling mortality is moderate, and the windthrow hazard is slight. The equipment limitation is moderate. Capability unit VIIe-1(15); Sandy range site.

JbG—Junipero sandy loam, 30 to 75 percent slopes. This is a steep and very steep soil on mountains. It has

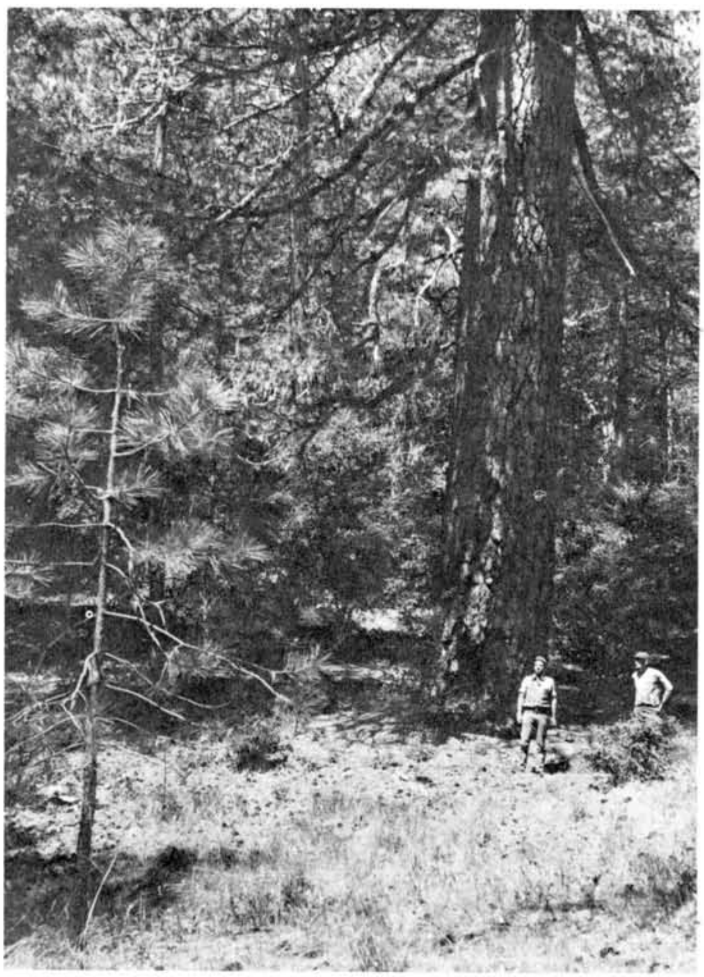

Figure 4.—An area of yellow pine on Junipero loamy sand, 30 to 50 percent slopes, in the Ventana Wilderness. The big tree in the middle is more than 8 feet in diameter and more than 200 feet tall.

the profile described as representative of the series. Exposure is to the north in canyons, and the elevation is 200 to 5,000 feet. Slopes are mostly about 60 percent.

Included with this soil in mapping and making up about 20 percent of the acreage were areas of Sheridan or Sur soils or small areas of soils that are similar, but are very gravelly or stony. Also included were small areas of Cieneba soils or dark colored soils that are less than 20 inches deep.

Runoff is rapid, and the erosion hazard is high.

This soil is used for watershed and wildlife habitat. It has moderately high productivity for ponderosa pine (the site index averages about 90). The seedling mortality is moderate, and the windthrow hazard is slight. The equipment limitation is severe. At lower elevations of less than about 1,000 feet, productivity is lower because the temperature is warmer and the rainfall is comparatively sparse. Capability unit VIIe-1(15); Granitic range site.

Jc—Junipero-Sur complex. The very steep and extremely steep soils in this complex are on mountains mainly in the Los Padres National Forest and the Ventana Wilderness. The soils were so intermingled that it was not feasible to map them separately at the scale used. The vegetation on the Sur soils consists mostly of tanoak, madrone, black oak, and laurel. Slopes are 50 to 85 percent.

Junipero and Sur soils each make up about 35 percent of the complex. The rest consists of soils less than 20 inches deep to bedrock; very stony loamy sands; Sheridan, Vista, and Cieneba soils; and Rock outcrop-Xerorthents association.

Runoff is very rapid, and the erosion hazard is very high.

This complex is used for recreation, wildlife habitat, and watershed. Most areas are inaccessible and can be reached only by foot trail or on horseback. The Junipero soil has moderate productivity for ponderosa pine (site index averages about 70 to 80). The seedling mortality and windthrow hazard are slight. The equipment limitation is severe because of slope. The Sur soil has low productivity (site index averages 50 to 60). The seedling mortality is moderate, and the windthrow hazard is slight. The equipment limitation is severe. Capability unit VIIIe-1(15); range site not assigned.

Linne Series

The Linne series consists of well drained soils on uplands. These soils formed in material underlain by calcareous sandstone and shale. Slopes are 5 to 75 percent. The vegetation consists of annual grasses and forbs. The elevation is 300 to 2,000 feet. The mean annual precipitation is 10 to 16 inches, the mean annual air temperature is 58° to 60° F, and the frost-free season is about 250 days. Summers are hot and dry, and winters are cool and moist.

In a representative profile the surface layer is dark gray silty clay loam 32 inches thick. Below this is dark grayish brown, calcareous silty clay loam 4 inches thick. It is underlain by weathered calcareous shale.

Permeability is moderately slow.

Linne soils are used mostly for range. Some are used for dryland grain.

Representative profile of Linne silty clay loam, 15 to

30 percent slopes, about 6 miles north of King City on the Topo Ranch, 1 mile NE from main building, 3,800 feet NE from reservoir, and 70 feet up hill from road.

A11—0 to 4 inches; dark gray (10YR 4/1) silty clay loam, very dark gray (10YR 3/1) when moist; weak medium platy structure that parts to moderate medium angular blocky; very hard, firm, sticky and plastic; many very fine roots; common very fine tubular pores; weakly effervescent with disseminated lime; moderately alkaline; gradual smooth boundary.

A12—4 to 16 inches; dark gray (10YR 4/1) silty clay loam, very dark gray (10YR 3/1) when moist; strong medium and coarse subangular blocky structure; hard, friable, sticky and plastic; common very fine roots; many very fine interstitial pores and many very fine and few fine tubular pores; strongly effervescent with disseminated lime; moderately alkaline; clear irregular boundary.

A13—16 to 32 inches; dark gray (10YR 4/1) silty clay loam, very dark gray (10YR 3/1) when moist; moderate coarse subangular blocky structure; hard, friable, sticky and plastic; common very fine roots; many very fine interstitial pores and common very fine and few fine tubular pores; strongly effervescent with disseminated lime and many fine filaments of lime toward bottom of horizon; moderately alkaline; gradual irregular boundary.

ACca—32 to 36 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) when moist; weak medium angular blocky structure; hard, friable, sticky and plastic; few very fine roots; common very fine interstitial pores and few very fine tubular pores; violently effervescent with disseminated lime and fine lime filaments covering 65 percent of ped faces; moderately alkaline; abrupt wavy boundary.

Cr—36 to 40 inches; weathered, very pale brown (10YR 7/3) calcareous shale.

The A1 horizon is very dark gray, dark gray, or gray. Chroma is commonly one, but may approach two in some places. Texture is silty clay loam or clay loam. The A1 horizon is weakly to strongly effervescent. The AC horizon is dark grayish brown or grayish brown. Weathered shale or sandstone that has thin to thick lime coatings on the fractures is at a depth of 20 to 40 inches.

LaD—Linne silty clay loam, 5 to 15 percent slopes. This is a gently rolling and rolling soil on plateaulike hills. It has a profile similar to the one described as representative of the series, but depth to weathered sandstone or shale is 30 to 40 inches. Slopes are mostly 13 percent.

Included with this soil in mapping were small areas of Diablo, Shedd, Nacimiento, and Los Osos soils and some areas of Linne soils that have slopes of up to 20 percent. Also included were a few areas that have a noncalcareous surface layer and a few soils that are deeper than 40 inches to bedrock.

Runoff is medium, and the erosion hazard is slight. Roots can penetrate to a depth of 30 to 40 inches. The available water capacity is 5 to 8 inches.

This soil is used for range and dryland grain. Capability unit IIIe–1(15); Clayey range site.

LaE—Linne silty clay loam, 15 to 30 percent slopes. This is a moderately steep soil on uplands. It has the profile described as representative of the series. Depth to bedrock is 24 to 40 inches. Slopes are mostly 25 percent.

Included with this soil in mapping were small areas of Diablo, Shedd, Nacimiento, San Benito, and Los Osos soils and a few areas of Linne soils that have slopes of 5 to 15 percent. Also included were some dark gray or dark grayish brown clay loams that are more than 40 inches deep to weathered bedrock.

Runoff is rapid, and the erosion hazard is moderate. Roots can penetrate to a depth of 24 to 40 inches. The available water capacity is 4 to 8 inches.

This soil is used mostly for range. A few areas are used for dryland grain. Capability unit IVe–1(15); Clayey range site.

LaF—Linne silty clay loam, 30 to 50 percent slopes. This is a steep soil on uplands. Depth to bedrock is 24 to 40 inches.

Included with this soil in mapping were areas of San Benito soils making up about 10 percent of the acreage, small areas of Nacimiento, Shedd, Diablo, and Los Osos soils, and a few areas of Linne soils that have slopes of less than 30 percent. Also included were dark gray or dark grayish brown clay loams that are less than 24 inches or more than 40 inches deep to weathered sandstone or shale. Some small landslips on the steeper slopes were also included.

Roots can penetrate to a depth of 24 to 40 inches. The available water capacity is 4 to 8 inches. Runoff is rapid, and the erosion hazard is high.

This soil is used for range. Capability unit VIe–1(15); Clayey range site.

LbD—Linne-Diablo complex, 9 to 15 percent slopes. This mapping unit consists of rolling soils on hills and ridgetops. They formed in material that was derived from calcareous shale and sandstone. The soils were so intermingled that it was not feasible to map them separately at the scale used.

Linne soils make up about 40 percent of this complex and Diablo soils 35 percent. The rest consists of small areas of Nacimiento, Shedd, Ayar, San Benito, and Alo soils; a few areas that have a gravelly surface layer; and some loams or clay loams that are similar to Linne soils, but more than 40 inches deep to bedrock.

The Linne soil has an available water capacity of 5 to 8 inches, and roots can penetrate to a depth of 30 to 40 inches. Runoff is medium, and the erosion hazard is slight.

This complex is used for range and dryland grain. Capability unit IIIe–1(15); Clayey range site.

LbE—Linne-Diablo complex, 15 to 30 percent slopes. The soils in this complex are hilly. They formed in material that was derived from calcareous sandstone and shale. These soils were so intermingled that it was not feasible to map them separately at the scale used.

Linne soils make up about 40 percent of this complex and Diablo soils 35 percent. The rest consists of areas of Nacimiento, Shedd, Ayar, San Benito, and Alo soils; a few areas where slopes are up to 40 percent; and areas of some soils that are less than 20 inches or more than 40 inches deep to bedrock. Small areas of Placentia, Chualar, and Rincon soils that have slopes of 5 to 15 percent were included on knolls along some of the canyons in the area extending from Portuguese Canyon north of Bradley southeast to Vinyard and Lowes Canyons.

The Linne soil has an available water capacity of 4 to 8 inches, and roots can penetrate to a depth of 24 to 40 inches. Runoff is medium, and the erosion hazard is moderate.

This complex is used mostly for range. A few areas

are used for dryland grain. Capability unit IVe–1(15); Clayey range site.

LcE—Linne-Shedd silty clay loams, 15 to 30 percent slopes. The soils in this complex are hilly. They formed in material that was derived from calcareous shale and sandstone. These soils were so intermingled that it was not feasible to map them separately at the scale used.

Linne soils make up about 40 percent of the complex and Shedd soils 30 percent. The rest is small areas of Diablo, Nacimiento, Ayar, and San Benito soils; areas where slopes are less than 15 percent; and some clay loams that are similar, but that are less than 24 inches or more than 40 inches deep to bedrock.

The Linne soil has an available water capacity of 4 to 8 inches, and roots can penetrate to a depth of 24 to 40 inches. The Shedd soil has an available water capacity of 4 to 7.5 inches, and roots can penetrate to a depth of 24 to 36 inches. Runoff is rapid, and the erosion hazard is moderate to high.

This complex is used mostly for range. Small areas are used for dryland grain. Capability unit IVe–1(15); Clayey range site.

LcF—Linne-Shedd silty clay loams, 30 to 50 percent slopes. The steep soils in this complex are on uplands. They formed in material that was derived from calcareous sandstone and shale. These soils were so intermingled that it was not feasible to map them separately at the scale used, although exposure is typically to the north on Linne soils and to the south on Shedd soils.

Linne soils make up about 40 percent of the complex and Shedd soils 25 percent. Diablo soils make up 15 percent. The rest of the complex consists of small areas of Nacimiento, San Benito, and Los Osos soils; some soils that are similar, but are less than 24 inches or more than 40 inches deep to bedrock; and areas of landslips.

Linne silty clay loam is 24 to 40 inches deep to bedrock, and the available water capacity is 4 to 8 inches. Shedd silty clay loam is 24 to 36 inches deep to bedrock, and the available water capacity is 4 to 7.5 inches.

Runoff is rapid, and the erosion hazard is high.

This complex is used for range. Capability unit VIe–1(15); Clayey range site.

LcF2—Linne-Shedd silty clay loams, 15 to 50 percent slopes, eroded. These are hilly and steep soils on uplands. They formed in material that was derived from calcareous sandstone and shale. Small rills and a few gullies are commonly at the heads of the major drainageways. Soil material has been deposited at the mouth of most drainageways. These soils were so intermingled that it was not feasible to map them separately at the scale used, although exposure is typically to the north on Linne soils and to the south on Shedd soils.

Linne and Shedd soils each make up about 35 percent of this complex. The rest consists of small areas of Diablo, Nacimiento, San Benito, and Los Osos soils; some severely eroded areas; areas that have exposed bedrock on ridges; some areas of clay loams that are less than 20 inches deep to bedrock; some small areas of landslips; and some areas that have slopes of more than 50 percent.

Linne silty clay loam has an available water capacity of 3.5 to 8 inches, and roots can penetrate to a depth of 20 to 40 inches. Shedd silty clay loam is 20 to 30 inches deep, and the available water capacity is 3.5 to 6 inches. Runoff is medium to rapid, and the erosion hazard is high. The erosion occurs mostly on Shedd soils, but some sheet erosion occurs on Linne soils.

This complex is used for range, wildlife habitat, and watershed. Capability unit VIe–1(15); Clayey range site.

LcG2—Linne-Shedd silty clay loams, 50 to 75 percent slopes, eroded. The soils in this complex are very steep and on uplands. They formed in material that was derived from calcareous sandstone and shale. These soils are so intermingled that it was not feasible to map them separately at the scale used, although exposure is typically to the north on Linne soils and to the south on Shedd soils.

Linne soils make up about 40 percent of the complex and Shedd soils 25 percent. Diablo soils make up about 15 percent of the complex and occur throughout the unit. The rest is small areas of Nacimiento, San Benito, and Los Osos soils; some soils that are very similar, but that are less than 20 inches or more than 40 inches deep to bedrock; and some small areas of landslips.

The Linne soil has an available water capacity of 4 to 8 inches and roots can penetrate to a depth of 20 to 40 inches. The Shedd soil has an available water capacity of 4 to 6 inches, and roots can penetrate to a depth of 20 to 30 inches. Runoff is very rapid, and the erosion hazard is very high. Shedd soils are more erodible than Linne soils.

This complex is used for range, watershed, and wildlife habitat. Capability unit VIIe–1(15); Clayey range site.

Lockwood Series

The Lockwood series consists of well drained soils that formed in alluvium that was derived from siliceous shale. These soils are on alluvial fans and inland and coastal terraces (fig. 5). Slopes are 0 to 15 percent. The vegetation is mainly annual grasses and a few thick stands of buckwheat and chamise and a few scattered oaks. The elevation is 70 to 1,200 feet. The mean annual precipitation is 12 to 35 inches, the mean annual air temperature is 57° to 60° F, and the frost-free season is 150 to 350 days. Summers are hot and dry inland; winters are generally cool and moist, but they are warm and foggy along the coast.

In a representative profile the surface layer is gray, very strongly acid to neutral shaly loam about 26 inches thick. The subsoil is gray, neutral shaly heavy loam and brown, mildly alkaline shaly clay loam that extends to a depth of 82 inches. The substratum is pale brown, mildly alkaline loam to a depth of 86 inches or more.

Permeability is moderately slow. Roots penetrate to a depth of more than 60 inches.

Lockwood soils are used mostly for irrigated field and row crops. Some areas are used for apricots, walnuts, and alfalfa and for dryland grain, irrigated pasture, and annual range as well as for recreation and wildlife habitat.

Representative profile of Lockwood shaly loam, 0 to 2 percent slopes, about 7 miles NW of King City on Central Avenue, 100 feet SW and 50 feet NW from the

Figure 5.—**Wave-cut coastal terraces at Pacific Valley. Fluvents, stony, are in the foreground and along the road. The rest of the terrace area is mainly Lockwood shaly loam, 2 to 9 percent slopes.**

corner of Teague and Central Avenues; about 30 feet from edge of road.

Ap1—0 to 3 inches; gray (10YR 5/1) shaly loam, very dark grayish brown (10YR 3/2) when moist; moderate fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; many very fine interstitial pores; 15 percent gravel-sized shale fragments; very strongly acid; low surface pH due to fertilizers or pesticides, low pH temporary; abrupt smooth boundary.

Ap2—3 to 16 inches; gray (10YR 5/1) shaly loam, very dark brown (10YR 2/2) when moist; weak very coarse angular blocky structure that parts to moderate medium granular; slightly hard, friable, slightly sticky and slightly plastic; few very fine and common fine roots; common very fine interstitial pores and very few fine tubular pores; 10 percent shale fragments; soil compacted by tillage; slightly acid; gradual smooth boundary.

A13—16 to 26 inches; gray (10YR 5/1) shaly loam, very dark brown (10YR 2/2) when moist; strong medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; many very fine interstitial pores and common fine and medium tubular pores; 10 percent shale fragments; neutral; gradual smooth boundary.

B1—26 to 40 inches; gray (10YR 5/1) shaly heavy loam, very dark grayish brown (10YR 3/2) when moist; moderate medium granular structure; soft, very friable, slightly sticky and slightly plastic; few fine and medium roots; many very fine interstitial pores and common fine tubular pores; 25 percent shale fragments; neutral; clear irregular boundary.

B21t—40 to 57 inches; brown (10YR 5/3) shaly clay loam, dark yellowish brown (10YR 4/4) when moist; massive; slightly hard, very friable, sticky and plastic; many very fine interstitial pores; ½-inch thick dark brown horizontal clay band; continuous thin clay films, few moderately thick clay films bridging mineral grains; 30 percent shale fragments; mildly alkaline; gradual wavy boundary.

B22t—57 to 82 inches; brown (10YR 5/3) shaly clay loam, dark brown (10YR 4/3) when moist; massive; slightly hard, very friable, sticky and plastic; many very fine interstitial pores; continuous thin and few moderately thick clay films bridging grains; 30 percent shale fragments; mildly alkaline; clear smooth boundary.

IIC—82 to 86 inches; pale brown (10YR 6/3) heavy loam, dark brown (10YR 4/3) when moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few thin clay films in pores; mildly alkaline.

The A horizon commonly is gray, very dark grayish brown, dark grayish brown, dark gray, or grayish brown. Texture is loam or clay loam. Shale fragments 2 to 40 milli-

meters (0.08 to 1.6 inch) in diameter make up 5 to 25 percent of the A horizon. Reaction ranges from very strongly acid to mildly alkaline. The very strongly acid reaction in the Ap horizon is probably due to the presence of such agents as fertilizers.

Depth to the B2t horizon commonly is 36 to 45 inches in the Salinas Valley and 20 to 30 inches in the Lockwood, Hames, and Jolon Valleys. The B2t horizon ranges from brown to very pale brown, and texture ranges from heavy loam to heavy clay loam that is 30 to 35 percent shale fragments in places. Reaction ranges from neutral to moderately alkaline. Common thin to moderately thick clay films bridge mineral grains.

The IIC horizon is quite variable over short distances. Commonly it is pale brown, light yellowish brown, or very pale brown loam. The content of coarse fragments ranges from a few to 60 percent pebbles. Reaction ranges from medium acid to moderately alkaline and commonly becomes more alkaline with increasing depth.

Lime, clay bands, or weakly cemented layers are in the lower B2t horizon or in the IIC horizon in some places. A3, B1, B3t, and B3 horizons commonly occur in the soils.

LdA—Lockwood loam, 0 to 2 percent slopes. This is a nearly level soil on broad alluvial plains. It has a profile similar to the one described as representative of the series, but it has less than 5 to 10 percent siliceous shale fragments. The surface layer commonly is loam, but can be clay loam or light clay loam.

Included with this soil in mapping were small areas of Lockwood shaly loam, 0 to 2 percent slopes.

The available water capacity is 8 to 10 inches. Runoff is slow, and the erosion hazard is slight.

This soil is used mostly for irrigated row and field crops. It is also used for dryland grain and alfalfa hay. Capability units I(14), IIIc–1(15); range site not assigned.

LdC—Lockwood loam, 2 to 9 percent slopes. This is a gently sloping to moderately sloping soil on alluvial fans and terraces. It has a profile similar to the one described as representative of the series, but it has less than 10 percent shale fragments. The surface layer commonly is loam, but can be silt loam or light clay loam. Slopes are mostly 4 percent.

Included with this soil in mapping were areas of Lockwood shaly loam, 0 to 2 percent slopes. Small areas of sheet and rill erosion were also included.

Runoff is medium, and the erosion hazard is moderate. The available water capacity is 8 to 10 inches.

This soil is used mostly for dryland grain, field crops, walnuts, and apricots. Capability units IIe–1(14), IIIe–1(15); range site not assigned.

LeA—Lockwood shaly loam, 0 to 2 percent slopes. This is a nearly level soil on alluvial fans and terraces. It has the profile described as representative of the series.

Included with this soil in mapping were areas of Rincon, Cropley, Arbuckle, Salinas, Pinnacles, and Chamise soils. Also included were areas of a soil that has a subsoil of sandy loam or loam or a subsoil that has more than 35 percent coarse fragments. Some soils that have slopes of 2 to 9 percent were also included.

The available water capacity is 6 to 8 inches. Runoff is slow, and the erosion hazard is slight.

This soil is used mostly for irrigated row and field crops. It is also used for some dryland grain or irrigated alfalfa. Capability units IIs–4(14), IIIs–4(15); range site not assigned.

LeC—Lockwood shaly loam, 2 to 9 percent slopes. This is a gently sloping to moderately sloping soil on alluvial fans and terraces. It has a profile similar to the one described as representative of the series, but the surface layer is shaly clay loam in some places (fig. 6). Slopes are mostly 5 percent.

Included with this soil in mapping were small areas of Lockwood shaly loam, 0 to 2 percent slopes. Also included were areas of Fluvents, stony, and Elder, Gazos, and Pacheco soils; some rock outcrops; and areas where slopes are as steep as 30 percent. The included areas from Big Sur to the Pacific Valley have an intricate pattern. They are black, slightly acid, shaly and very shaly loams that are underlain by brown very gravelly sandy loam. They contain 45 to 50 percent gravel and 10 to 20 percent cobblestones.

The available water capacity is 6 to 8 inches. Runoff is slow or medium, and the erosion hazard is slight or moderate.

This soil is used mostly for field crops, walnuts, apricots, or alfalfa. Along the coast it is used mainly for annual range, dryland and some irrigated pasture, and recreation. Capability units IIe–4(14), IIIe–4(15); range site not assigned.

LeD—Lockwood shaly loam, 9 to 15 percent slopes.

Figure 6.—**Profile of Lockwood shaly loam, 2 to 9 percent slopes, at Pacific Valley.**

This is a strongly sloping soil on alluvial fans and terraces.

Included with this soil in mapping were small areas of Rincon, Chamise, Santa Lucia, Nacimiento, Arbuckle, and Pinnacles soils and Lockwood shaly loam, 2 to 9 percent slopes. The included areas along the coast have an intricate pattern. They are black, slightly acid shaly and very shaly loams that are underlain by brown, slightly acid very gravelly sandy loam. They contain 45 to 50 percent gravel and 10 to 20 percent cobblestones. Also included along the coast were areas of Gazos and Los Osos soils; a shaly loam that is less than 20 inches deep to bedrock; and a soil that is similar to this Lockwood soil, but that has more than 35 percent coarse fragments in the subsoil. Included near Pfeiffer Point and south of Cape San Martin, was about 200 acres of a grayish brown and dark grayish brown gravelly loam that has a subsoil of dark grayish brown and brown stony or gravelly clay loam that is underlain by hard metamorphosed sandstone and shale.

The available water capacity is 6 to 8 inches. Runoff is medium, and the erosion hazard is moderate.

This soil is used mostly for dryland grain and annual range. Along the coast it is also used for annual range, recreation, wildlife habitat, and building sites. Capability units IIIe-4(14), IIIe-4(15); range site not assigned.

LgA—Lockwood shaly loam, 0 to 2 percent slopes, wet. This soil is in swales on alluvial fans and on bottoms in small valleys. It has a water table at a depth of 28 to 48 inches during winter and spring or when overirrigated. Drainage is restricted by a slowly permeable layer that is typically below a depth of 60 inches. The subsoil is generally grayish brown.

Included with this soil in mapping were small areas of Lockwood shaly loam, 0 to 2 percent slopes, and Cropley and Clear Lake soils. Also included were small areas that have 3 percent slopes, have more than 35 percent gravel, or have a clay subsoil.

Runoff is commonly very slow, and a few areas are ponded during winter. The erosion hazard is slight. Roots generally can penetrate to a depth of more than 60 inches, but can be restricted to a depth of 28 to 48 inches by an intermittently high water table in undrained areas. The available water capacity is 6 to 8 inches.

This soil is used for irrigated pasture, field crops, and native pasture and dryland grain. Capability unit IIw-2(14); range site not assigned.

Lopez Series

The Lopez series consists of somewhat excessively drained soils on hilly uplands. These soils formed in material underlain by hard siliceous shale of the Monterey Formation. Slopes are 15 to 30 percent. The vegetation is mainly annual grasses and a few scattered thickets of scrub oak, chamise, and buckwheat. The elevation is 450 to 3,300 feet. The mean annual precipitation is 12 to 25 inches, the mean annual air temperature is about 60° F, and the frost-free season is about 250 days. Summers are hot and dry, and winters are cool and moist.

In a representative profile the surface layer is gray and grayish brown, medium acid shaly loam and shaly silt loam. It is underlain by strongly acid hard shale at a depth of 11 inches.

Permeability is moderate, and the available water capacity is about 1 inch. Roots penetrate to a depth of 10 to 20 inches.

Lopez soils are used mostly for watershed and wildlife habitat, and some areas are in annual range.

Representative profile of Lopez shaly loam, 15 to 30 percent slopes, about 1,600 feet NNW of Lockwood; on San Ardo Road in the center of NW¼NE¼ sec. 31, T. 22 S., R. 9 E.

A11—0 to 4 inches; gray (10YR 5/1) shaly loam, very dark grayish brown (10YR 3/2) when moist; moderate fine and medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; many very fine interstitial pores and few tubular pores; 35 percent angular shale; medium acid; clear wavy boundary.

A12—4 to 11 inches; grayish brown (10YR 5/2) shaly silt loam, dark grayish brown (10YR 3.5/2) when moist; moderate fine and medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; common very fine pores; 45 percent angular shale; medium acid; abrupt broken boundary.

R—11 to 15 inches; hard, fractured siliceous shale; strongly acid.

The A1 horizon is dark gray, gray, or grayish brown. The content of coarse fragments ranges from 35 to 50 percent. Reaction is strongly acid or medium acid. Depth to hard shale ranges from 10 to 20 inches.

LhE—Lopez shaly loam, 15 to 30 percent slopes. This is a hilly soil on uplands. Slopes are mostly 20 percent.

Included with this soil in mapping were small areas of Santa Lucia and Reliz soils, rock outcrops, and areas of moderate or severe erosion.

Runoff is medium, and the erosion hazard is high.

This soil is used for annual range, watershed, and wildlife habitat. Capability unit VIIe-1(15); Shallow Loamy range site.

Los Gatos Series

The Los Gatos series consists of well drained soils that formed on uplands in material that was derived from metamorphosed sandstone and shale of the Franciscan Formation. Slopes are 30 to 75 percent. The vegetation is mainly Douglas-fir, Coulter and ponderosa pine, madrone, coast redwood, tanoak, laurel, coast live oak, poison oak, bracken fern, and sedges. The elevation is 600 to 3,200 feet. The mean annual precipitation is 25 to 55 inches, the mean annual air temperature is 56° F, and the frost-free season is about 300 days. Summers are warm and dry, and winters are cool and moist.

In a representative profile the surface layer is brown, slightly acid gravelly loam about 18 inches thick. The subsoil is brown, slightly acid gravelly loam and gravelly sandy clay loam 18 inches thick. The underlying bedrock is fractured, hard, metamorphosed shale.

Permeability is moderately slow, and the available water capacity is 3 to 7 inches. Roots penetrate to a depth of 20 to 40 inches.

Los Gatos soils are used mostly for range, woodland, recreation, wildlife habitat, and watershed.

Representative profile of Los Gatos gravelly loam, 50 to 75 percent slopes, on Willow Creek Road, 1 mile

west from the intersection of Alder Creek Camp Road, about 300 feet below the road on the north slope, in NE¼SW¼ sec. 35, T. 23 S., R. 5 E.

O1—3 inches to 0; layer of leaves, pine needles, and twigs.

A1—0 to 18 inches; brown (10YR 5/3) gravelly loam, dark brown (7.5YR 3/2) when moist; moderate fine and medium crumb structure; slightly hard, very friable, nonsticky and nonplastic; common fine and medium roots; common very fine and fine and few coarse and medium interstitial and tubular pores; 25 percent gravel; slightly acid; clear wavy boundary.

B1—18 to 25 inches; brown (7.5YR 5/4) gravelly loam, dark reddish brown (5YR 3/4) when moist; moderate coarse granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine and medium roots; common fine, medium, and coarse tubular pores; 30 percent gravel; slightly acid; clear wavy boundary.

B2t—25 to 36 inches; brown (7.5YR 5/4) gravelly sandy clay loam, dark reddish brown (5YR 3/4) when moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine, medium, and coarse roots; many very fine and fine interstitial and tubular pores; few thin clay films bridging grains and lining pores; 30 percent gravel; slightly acid; gradual irregular boundary.

R—36 to 40 inches; hard, fractured, metamorphosed shale.

The A1 horizon ranges from brown to grayish brown or yellowish brown. Texture is gravelly loam or loam that is 10 to 30 percent pebbles. Structure is crumb, granular, or subangular blocky. Reaction is medium acid or slightly acid.

There is no B1 horizon in some places. The B2t horizon ranges from brown to light brown or reddish brown, and texture is gravelly sandy clay loam, gravelly heavy loam, heavy loam, clay loam, or gravelly clay loam. Gravel content ranges from 10 to 30 percent. Reaction is slightly acid or medium acid.

The soil in the fractures in the R horizon ranges from light brown to reddish yellow, pink, brown, very pale brown, or yellowish red. Texture is very gravelly sandy clay loam and very gravelly clay loam that is 70 to 80 percent coarse fragments. Reaction is slightly acid or medium acid. Depth to bedrock is 20 to 40 inches.

LkF—Los Gatos gravelly loam, 30 to 50 percent slopes. This is a steep soil on uplands. Slopes are mostly 45 percent.

Included with this soil in mapping were small areas of McCoy very stony subsoil variant and Gilroy, Gazos, McMullin, Millsholm, Reliz, and Plaskett soils. Also included were small areas that are less than 20 inches deep to bedrock, have more than 35 percent coarse fragments in the subsoil, or have a pale brown surface layer. Some areas that have moderate erosion or have slopes of somewhat less than 30 percent were also included.

Runoff is rapid, and the erosion hazard is high.

This soil is used mostly for range, woodland, recreation, and wildlife habitat. If it is used for ponderosa pine, it is moderately productive (site index averages about 70). The seedling mortality is moderate, and the windthrow hazard is slight. The equipment limitation is moderate. Capability unit VIe-1(15); Loamy range site.

LkG—Los Gatos gravelly loam, 50 to 75 percent slopes. This is a very steep soil on uplands. It has the profile described as representative of the series. Slopes are mostly 60 percent.

Included with this soil in mapping were small areas of Gilroy, Plaskett, McMullin, Sur, Gamboa, Los Osos, Millsholm, Gazos, Montara, Reliz, and Henneke soils, Rock outcrop-Xerorthents complex, and soils that are similar to this Los Gatos soil, but that are less than 20 inches deep to bedrock. Included south of The Indians near Salsipuedes Creek and the San Antonio River, was about 700 acres of a soil that has a light yellowish brown surface layer and a very strongly acid subsoil. Also included were some small areas where erosion is moderate, small areas of landslips, and some areas of soils that have a brown or grayish brown surface layer more than 20 inches thick and a subsoil that has more than 35 percent coarse fragments.

Runoff is very rapid, and the erosion hazard is very high.

This soil is used mostly for range, woodland, recreation, wildlife habitat, and watershed. If it is used for ponderosa pine, the soil has low productivity (site index averages about 50). The seedling mortality is high, and the windthrow hazard is slight. The equipment limitation is severe. Capability unit VIIe-1(15); Loamy range site.

Los Osos Series

The Los Osos series consists of well drained soils that formed on uplands in material derived from sandstone, shale, and some meta-sedimentary rocks. Slopes are 9 to 75 percent. The vegetation consists of annual grasses, forbs, scattered oaks, and some brush. The elevation is 800 to 3,500 feet. The mean annual precipitation is 12 to 35 inches, the mean annual air temperature is 57° to 62° F, and the frost-free season is 150 to 250 days. Summers are hot and dry, and winters are cool and moist.

In a representative profile the surface layer is dark grayish brown, slightly acid clay loam about 11 inches thick. The upper 12 inches of the subsoil is brown, slightly acid clay, and the lower part of the subsoil is light yellowish brown, slightly acid clay. It is underlain by sandstone at a depth of 31 inches.

Permeability is slow, and the available water capacity is 4 to 7.5 inches. Roots penetrate to a depth of 24 to 40 inches.

Los Osos soils are mostly used for range and, in some areas, for dryland grain.

Representative profile of Los Osos clay loam, 30 to 50 percent slopes, about ½ mile north on Slack Canyon Road past the Bagby Ranch intersection, then 60 feet west on hillside in NE¼SW¼ sec. 6, T. 22 S., R. 13 E.

A1—0 to 11 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) when moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; many fine and very fine roots; many fine and very fine tubular and interstitial pores; slightly acid; clear wavy boundary.

B2t—11 to 23 inches; brown (10YR 4/3) clay, dark brown 10YR 3/3) when moist; strong medium and coarse subangular blocky structure; extremely hard, firm, sticky and plastic; common very fine and medium and few coarse roots; common fine and very fine and few medium tubular pores; common thin clay films lining pores and on faces of peds; slightly acid; gradual wavy boundary.

B3t—23 to 31 inches; light yellowish brown (2.5Y 6/4) clay, light olive brown (2.5Y 5/4) when moist; weak medium and coarse subangular blocky structure; very hard, firm, sticky and plastic; common fine and medium roots; common very fine and fine and few medium and coarse tubular pores; few thin

clay films lining pores and on faces of peds; slightly acid; gradual wavy boundary.

Cr—31 to 36 inches; very pale brown sandstone.

The A1 horizon is dark gray, dark grayish brown, gray, grayish brown, or brown. Texture typically is clay loam, but ranges to loam, silt loam, silty clay loam, or sandy clay loam. Reaction is slightly acid or neutral. The boundary between the A1 and B2t horizons is clear or gradual, and in some places there is a transitional A3 horizon or B1 horizon.

The B2t horizon ranges from dark brown to pale brown. Texture commonly is clay but it is heavy clay loam in places. Reaction ranges from medium acid to neutral. The B3t horizon or B3 horizon ranges from grayish brown to very pale brown. Texture commonly is clay or clay loam, and it is shaly clay loam in places. Reaction is medium acid to neutral. Depth to bedrock ranges from 24 to 40 inches.

LmD—Los Osos clay loam, 9 to 15 percent slopes. This is a strongly sloping soil on hills. Slopes are mostly 10 percent.

Included with this soil in mapping were small areas of Diablo, Chamise, Rincon, Dibble, Nacimiento, and Alo soils.

Runoff is medium, and the erosion hazard is moderate.

This soil is mostly used for range and dryland grain. Capability unit IIIe-3(15); Fine Loamy range site.

LmE—Los Osos clay loam, 15 to 30 percent slopes. This is a moderately steep soil on uplands. Slopes are mostly 18 percent.

Included with this soil in mapping were small areas of Nacimiento, Diablo, Dibble, Gazos, McCoy, San Andreas, Alo, Rincon, and Placentia soils.

Runoff is medium, and the erosion hazard is moderate.

This soil is used mostly for dryland grain and range. Capability unit IVe-3(15); Fine Loamy range site.

LmF—Los Osos clay loam, 30 to 50 percent slopes. This is a steep soil on uplands. It has the profile described as representative of the series. Slopes are mostly 40 percent.

Included with this soil in mapping were small areas of San Benito, Millsholm, Dibble, Gazos, Alo, McCoy, San Andreas, Gilroy, and Santa Lucia soils. Also included were some areas of soils that have a surface layer that is sandy loam or is light brownish gray and that are gravelly throughout the profile and some areas where the depth to bedrock is 40 to 60 inches. In the southern part of the county, other soils included in mapping were Climara, Gilroy, Dibble, and Millsholm soils. In this area, the surface layer and subsoil of this soil are less thick than is representative of the Los Osos series.

Runoff is rapid, and the erosion hazard is high.

This Los Osos soil is used mostly for range. Capability unit VIe-1(15); Fine Loamy range site.

LmG—Los Osos clay loam, 50 to 75 percent slopes. This is a very steep soil on uplands. Slopes are mostly 60 percent.

Included with this soil in mapping were small areas of San Benito, Nacimiento, Millsholm, San Andreas, and Santa Lucia soils. Small areas of landslides and areas that have moderate and severe sheet erosion were also included. Included near the Hunter Liggett military headquarters were areas where the surface layer is sandy loam and the soils commonly are gravelly throughout the profile.

Runoff is rapid and very rapid, and the erosion hazard is high and very high.

This soil is used mostly for range. Capability unit VIIe-1(15); Fine Loamy range site.

Ln—Los Osos-Millsholm complex. This mapping unit consists of steep and very steep soils on hills and mountains. They formed in material that was derived from metamorphosed sandstone, shale, and serpentine of the Franciscan Formation. These soils were so intermingled or so small in extent that it was not feasible to map them separately at the scale used. Slopes are 30 to 75 percent.

Los Osos soils make up about 40 percent of this complex and Millsholm soils 20 percent. The rest consists of Gilroy, Lopez, Reliz, McMullin, Climara, Henneke, Montara, and Plaskett soils; a dark grayish brown, slightly acid loam or clay loam that is 10 to 20 inches deep to bedrock; and rock outcrops.

Runoff is rapid or very rapid, and the erosion hazard is high or very high.

This complex is used for range, wildlife habitat, and watershed. Capability unit VIIe-1(15); Los Osos soil in Fine Loamy range site, Millsholm soil in Shallow Loamy range site.

McCoy Series

The McCoy series consists of well drained soils on hilly uplands. These soils formed in material underlain by weathered granodiorite or schist. Slopes are 15 to 75 percent. The vegetation consists of annual grasses, bur clover, forbs, brush, and a few scattered oaks. The elevation is 400 to 2,900 feet. The mean annual precipitation is 12 to 25 inches, the mean annual air temperature is 57° to 59° F, and the frost-free season is about 250 days. Summers are hot and dry, and winters are cool and moist.

In a representative profile the surface layer is about 18 inches thick. It is dark brown, slightly acid loam and neutral clay loam. The subsoil is dark brown and dark yellowish brown, mildly alkaline clay loam 9 inches thick. The substratum is weathered granodiorite.

Permeability is moderately slow.

McCoy soils are mostly used for range, and some areas are used for dryland grain.

Representative profile of McCoy clay loam, 30 to 50 percent slopes, about 8 miles NE of Gonzales on Johnson Canyon Road; 1.85 miles east from locked main ranch gate on road and 200 feet north of the point where Muddy Creek crosses the ranch road; in the center of SE¼NW¼ sec. 31, T. 15 S., R. 6 E.

Ap—0 to 2 inches; dark brown (10YR 3/3) loam, very dark grayish brown (10YR 3/2) when moist; moderate medium platy structure that parts to moderate fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots; common very fine interstitial pores and few very fine tubular pores; 5 percent fine angular pebbles and mineral grains; slightly acid; abrupt smooth boundary.

A12—2 to 4 inches; dark brown (10YR 3/3, dry and moist) clay loam; moderate medium angular blocky structure; hard, friable, sticky and plastic; common fine and few very fine roots; common very fine interstitial pores and few very fine tubular pores; 10 percent fine angular pebbles and mineral grains; neutral; clear wavy boundary.

A13—4 to 18 inches; dark brown (10YR 3/3) clay loam, dark yellowish brown (10YR 3/4) when moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; common fine and few very fine roots; common very fine interstitial pores and many fine and common very fine tubular pores; 10 percent fine angular pebbles and mineral grains; neutral; clear wavy boundary.

B2t—18 to 22 inches; dark brown (10YR 3/3) clay loam, very dark grayish brown (10YR 3/2) when moist; weak medium subangular blocky structure; hard, friable, sticky and plastic; common fine and few very fine roots; few very fine interstitial pores and few very fine tubular pores; many thin clay films in pores, on faces of peds, and bridging mineral grains; few moderately thick clay films in pores; 15 percent fine angular pebbles and mineral grains; mildly alkaline; abrupt wavy boundary.

B3t—22 to 27 inches; dark yellowish brown (10YR 4/4) clay loam, dark brown (10YR 3/3) when moist; massive; hard, friable, slightly sticky and plastic; few very fine roots; few very fine interstitial pores and few fine and very fine tubular pores; common thin clay films bridging grains and in pores; 15 percent fine angular pebbles and mineral grains; mildly alkaline; abrupt wavy boundary.

Cr—27 to 37 inches; weathered granodiorite; noncalcareous; mildly alkaline.

Depth to bedrock ranges from 20 to 40 inches. In some places the bedrock is calcareous. Coarse fragments make up from 0 to 20 percent of the soil profile.

The A horizon ranges from very dark gray and dark gray to dark brown when dry and from black to very dark grayish brown or dark yellowish brown when moist. Texture is loam, clay loam, or sandy clay loam. Reaction ranges from slightly acid to mildly alkaline. There is an A3 horizon, B1 horizon, or B1t horizon in some places.

The B2t horizon has colors similar to the A horizon and, in addition, is grayish brown, brown, and dark reddish brown. Texture is sandy clay loam, heavy loam, or clay loam. Reaction ranges from slightly acid to moderately alkaline, and commonly becomes more alkaline with increasing depth.

The C horizon is weathered granodiorite, schist, or granite that is easily crushed in the hand. Reaction ranges from neutral to moderately alkaline. Lime is commonly segregated in soft masses.

MaE—McCoy clay loam, 15 to 30 percent slopes. This is a moderately steep soil on low hills. It has a profile similar to the one described as representative of the series, but depth to weathered bedrock is typically 36 to 40 inches.

Included with this soil in mapping were small areas of Sheridan, Vista, Placentia, Gloria, and Danville soils and McCoy soils that have slopes of 5 to 15 percent or 30 to 50 percent. Also included were soils that are very similar to McCoy soils, but that are less than 20 inches or 40 to 60 inches deep to weathered bedrock. This soil is moderately eroded in some farmed areas.

Runoff is medium, and the erosion hazard is moderate. Roots can penetrate to a depth of 30 to 40 inches. The available water capacity is 5.5 to 8 inches.

This soil is used for range and, on the lower slopes, for dryland grain. Capability unit IVe–1(15); Granitic Clay range site.

MaF—McCoy clay loam, 30 to 50 percent slopes. This is a steep soil on hills. It has the profile described as representative of the series. Depth to bedrock is 20 to 40 inches.

Included with this soil in mapping were small areas of Sheridan, Gilroy, Vista, Danville, Linne, Placentia, Junipero, and Los Osos soils and McCoy soils that have slopes of less than 30 or more than 50 percent. Also included were areas that have a subsoil of heavy clay loam or clay, making up about 30 percent of the acreage; soils that have a subsoil of yellowish brown to olive clay; soils that commonly have southern exposures and a few areas of soils that have northern exposures and have a dark reddish brown and reddish brown surface layer and a dark red subsoil; and some soils that have lime throughout the profile. A few gullies cutting almost vertical sides in drainageways were also included. Some soils were included that are very similar to McCoy soils, but that are less than 20 inches or 40 to 60 inches deep to weathered bedrock.

Roots can penetrate to a depth of 20 to 40 inches. The available water capacity is 3.5 to 8 inches. Runoff is rapid, and the erosion hazard is moderate.

This soil is mostly used for range. Capability unit VIe–1(15); Granitic Clay range site.

MaG—McCoy clay loam, 50 to 75 percent slopes. This is a very steep soil on hills. Depth to bedrock ranges from 20 to 40 inches. Slopes are mostly 50 to 60 percent.

Included with this soil in mapping were areas of McCoy clay loam, 30 to 50 percent slopes.

Runoff is very rapid, and the erosion hazard is high. Roots can penetrate to a depth of 20 to 40 inches. The available water capacity is 3.5 to 8 inches.

This soil is used for range, watershed, and wildlife habitat. Capability unit VIIe–1(15); Granitic Clay range site.

MbE—McCoy-Gilroy complex, 15 to 30 percent slopes. This mapping unit consists of moderately steep soils on smooth hills in relatively small areas. These soils were so intermingled that it was not feasible to map them separately at the scale used.

McCoy soils make up 45 percent of this complex and Gilroy soils 30 percent. The rest consists of small areas of Vista and San Timoteo soils, soils that are similar but that have bedrock at a depth of 40 to 60 inches, eroded areas where the subsoil is exposed, and soils that have slopes of less than 15 percent or more than 30 percent.

The McCoy soil has an available water capacity of 5.5 to 8 inches and roots can penetrate to a depth of 30 to 40 inches. The Gilroy soil has an available water capacity of 3 to 7 inches, and roots can penetrate to a depth of 24 to 36 inches. The Gilroy soil formed in material that was derived from granite rather than basic igneous rock. Runoff is rapid, and the erosion hazard is moderate.

This complex is used for range and dryland grain. Capability unit IVe–1(15); McCoy soil in Granitic Clay range site, Gilroy soil in Granitic range site.

MbG—McCoy-Gilroy complex, 30 to 75 percent slopes. This mapping unit consists of steep and very steep soils on smooth, rounded hills. These soils were so intermingled that it was not feasible to map them separately at the scale used.

McCoy soils make up 35 percent of this complex and Gilroy soils 25 percent. The rest consists of Vista and San Timoteo soils in areas that have southern exposures and on ridgetops, Sheridan soils in areas that have northern exposures, Pinnacles soils, McCoy soils that have slopes of less than 30 percent, a soil that has a clay subsoil, and soils that are less than 20 inches or more than 40 inches deep to bedrock.

The McCoy soil has an available water capacity of

3.5 to 8 inches and roots can penetrate to a depth of 20 to 40 inches. The Gilroy soil has an available water capacity of 3 to 5 inches and roots can penetrate to a depth of 20 to 30 inches. This Gilroy soil formed in material that was derived from granite rather than hard basic igneous rock. Runoff is rapid or very rapid, and the erosion hazard is high.

This complex is used mostly for range. Capability unit VIIe–1(15); McCoy soil in Granitic Clay range site, Gilroy soil in Granitic range site.

McCoy Variant

The McCoy variant consists of well drained soils on uplands. These soils formed in material underlain by gravelly, mixed, unconsolidated slump material or bedrock of the Franciscan Formation. Slopes are 30 to 75 percent. The vegetation consists of annual grasses and forbs, coastal chaparral, and a few scattered oaks. The elevation ranges from about 200 to 3,200 feet, and exposure is mostly to the south. The mean annual precipitation is 25 to 50 inches, the mean annual air temperature is 56° to 60° F, and the frost-free season ranges from 300 to 350 days. Summers are warm and dry with intermittent fog, and winters are cool and moist.

In a representative profile the surface layer is grayish brown and dark grayish brown, slightly acid gravelly loam about 17 inches thick. The subsoil is 17 inches thick. It is brown, slightly acid extremely stony clay loam and brown, neutral very stony clay loam. The substratum is light brown, neutral gravelly clay loam. It is underlain by fractured metamorphosed sandstone at a depth of 53 inches.

Permeability is moderately slow, and the available water capacity is 3 to 5 inches. Roots penetrate to a depth of 40 to more than 60 inches.

The McCoy variant is mostly used for range, wildlife habitat, watershed, and recreation.

Representative profile of McCoy gravelly loam, very stony subsoil variant, 30 to 75 percent slopes, 700 feet north of State Highway 1, uphill from service station at Lucia, near SE corner of NW¼NE¼NE¼ sec. 17, T. 22 S., R. 4 E.

A11—0 to 6 inches; grayish brown (10YR 5/2) gravelly loam, very dark brown (10YR 2/2) when moist; moderate fine and medium granular and crumb structure; hard, friable, slightly sticky and slightly plastic; common fine roots; common fine tubular pores and many very fine and fine interstitial pores; 25 percent mainly 25- to 30-millimeter angular to subrounded gravel; slightly acid; clear wavy boundary.

A12—6 to 17 inches; dark grayish brown (10YR 4/2) gravelly heavy loam, very dark brown (10YR 2/2) when moist; moderate fine and medium crumb structure; hard, friable, slightly sticky and slightly plastic; many fine roots; common and many fine tubular and interstitial pores; few moderately thick and common thin pressure faces against gravel contacts; 30 percent 2- to 30-millimeter gravel; slightly acid; clear irregular boundary.

IIB21t—17 to 25 inches; brown (10YR 5/3) extremely stony clay loam, dark brown (10YR 3/3) when moist; moderate fine subangular blocky structure; slightly hard and hard, friable, sticky and plastic; common fine roots; many fine tubular pores; many thin and common moderately thick clay films bridging mineral grains, common thin clay films lining pores; some krotovinas 2 to 4 inches in diameter filled with material similar to above horizons; about 35 percent stones, 15 percent cobblestones, and 20 percent gravel; slightly acid; clear wavy boundary.

IIB22t—25 to 34 inches; brown (10YR 5/3) very stony light clay loam, dark brown (10YR 3/3) when moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and plastic; very few very fine roots; many very fine and fine tubular pores and few fine interstitial pores; many thin clay films on faces of peds; many thin, common moderately thick, and few thick clay films lining pores and bridging mineral grains; about 30 percent gravel, 5 percent cobblestones, and 10 percent stones; neutral; clear wavy boundary.

IIC—34 to 53 inches; light brown (7.5YR 6/4) gravelly clay loam, brown (7.5YR 4/4) when moist; massive; hard and slightly hard, friable, sticky and plastic; many very fine and common fine tubular pores; common thin and few thick clay films lining pores and bridging mineral grains; about 30 percent gravel, 5 percent cobblestones, and 2 percent stones; neutral; clear irregular boundary.

IIIR—53 to 55 inches; fractured metamorphosed sandstone and shale.

The A1 horizon ranges from very dark gray to brown when dry and from black to dark brown when moist. Texture ranges from heavy sandy loam to loam and is gravelly or cobbly. Consistence is hard or slightly hard. Reaction is slightly acid to neutral.

In a few places there is a B1 or B1t horizon that is similar to the IIB2t horizon, but it has less clay and in some places has clay films. The IIB2t horizon ranges from dark gray to brown and, at a depth below 24 inches, to light yellowish brown. Texture is sandy clay loam, heavy loam, or clay loam that is very gravelly, very cobbly, very stony, or extremely stony. Structure ranges from granular or crumb to blocky. In a few places there is a B3t horizon that is similar to the IIB2t, but it commonly is light reddish yellow.

The IIC horizon is light brownish yellow or light brown and commonly is at a depth of 24 to 40 inches. In places metamorphic rock of the Franciscan Formation or acid igneous rock underlies the IIBt or IIC horizon at a depth of 40 inches or more.

McG—McCoy gravelly loam, very stony subsoil variant, 30 to 75 percent slopes. This is a steep and very steep soil on mountains.

Included with this soil in mapping were small areas of Gamboa, Sheridan, Pfeiffer, Gazos, Millsholm, Lopez, and Los Osos soils. Also included were small areas of soils that have no subsoil, soils that have a subsoil that is less than 35 percent coarse fragments, and soils that have a dark surface layer and are less than 20 inches deep. Some small areas of McCoy variant soils that are underlain by bedrock at a depth of less than 40 inches, areas that have slopes of greater than 75 percent or less than 30 percent slopes, eroded or gullied areas, or areas that have up to 3 percent rock outcrops and boulders were also included.

Runoff is rapid or very rapid, and the erosion hazard is high.

This soil is used for wildlife habitat, watershed, and recreation. A few areas are used for range. Capability unit VIIe–1(15); Loamy range site.

McMullin Series

The McMullin series consists of somewhat excessively drained soils on mountains. These soils formed in material underlain by sandstone and shale. Slopes are 30 to 75 percent. The vegetation consists of mixed hardwoods, pines, and brush. The elevation is 1,500 to 4,200

feet. The mean annual precipitation is 30 to 70 inches, the mean annual air temperature is 51° to 57° F, and the frost-free season is 200 to 300 days. Summers are warm and dry, and winters are cool and moist.

In a representative profile the soil is about 15 inches thick. It is dark grayish brown, slightly acid gravelly loam and brown, medium acid gravelly loam. It is underlain by fractured fine grained sandstone.

Permeability is moderate, and the available water capacity is 1 to 3 inches. The depth to which roots can readily penetrate is 10 to 20 inches, although some roots follow fractures in the bedrock for many feet.

McMullin soils are used for wildlife habitat, watershed, and as a site for military maneuvers.

Representative profile of McMullin gravelly loam in an area of McMullin-Plaskett complex, about 0.1 mile east from the junction of Burma Road and Coast Ridge Road and about 300 feet north from Burma Road, in SW¼NW¼SE¼ sec. 19, T. 23 S., R. 6 E.

O—1½ inches to 0; litter of leaves and twigs, mainly from scrub interior live oak; slightly acid; abrupt wavy boundary.

A11—0 to 7 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) when moist; weak fine and medium crumb structure; soft, very friable, nonsticky and nonplastic; many very fine and few fine and medium roots; many very fine tubular and interstitial pores; 20 percent gravel; slightly acid; gradual wavy boundary.

A12—7 to 15 inches; brown (10YR 5/3) gravelly loam, dark brown (7.5YR 4/2) when moist; weak fine and medium crumb and granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine, few fine, many medium, and common coarse roots; many very fine tubular and interstitial pores; 25 percent gravel; medium acid; clear irregular boundary.

R—15 to 18 inches; light olive gray (5Y 6/2), fractured fine grained sandstone; few fine, medium and coarse roots in fractures; medium acid.

Texture of the A1 horizon is sandy loam, loam, gravelly sandy loam, gravelly loam, or stony loam. The A1 horizon is 7 to 20 inches thick. In some places a B2 horizon or C horizon overlies the fractured bedrock. Depth to bedrock ranges from 10 to 20 inches.

Md—McMullin-Plaskett complex. This mapping unit consists of steep and very steep soils on mountains. These soils were so intermingled that it was not feasible to map them separately at the scale used. Slopes are 30 to 75 percent.

McMullin and Plaskett soils each make up about 35 percent of this complex. The rest consists of small areas of Sur and Millsholm soils; a soil that has a subsoil of clay loam; similar soils that are less than 10 inches deep to bedrock; areas of rock outcrops; and areas of Gilroy soils on ridgetops on the Hunter Liggett military base east of the Nacimiento River.

Runoff is rapid and very rapid, and the erosion hazard is high or very high.

This complex is used mostly for watershed and wildlife habitat. The McMullin soil has moderately low productivity for ponderosa pine (site index averages about 60). The seedling mortality is moderate, and the windthrow hazard is slight. The equipment limitation is severe. The Plaskett soil has low productivity for ponderosa pine (site index about 50). The seedling mortality is moderate, and the windthrow hazard is moderate. The equipment limitation is severe.

Most areas of these soils are used for noncommercial trees such as interior live oak, madrone, and laurel. These species commonly are scrubs. There are a few scattered Coulter pine, knobcone pine, and digger pine. Capability unit VIIe-1 (15); range site not assigned.

Metz Series

The Metz series consists of somewhat excessively drained soils that formed in alluvium that was derived mostly from sedimentary rocks on flood plains and sand dunes. Slopes are 0 to 9 percent. The vegetation consists mainly of annual grasses, forbs, and a few scattered willows and cottonwoods. The elevation is 50 to 500 feet. The mean annual precipitation is 12 to 14 inches, the mean annual air temperature is 58° to 60° F, and the frost-free season is about 260 days. Summers are warm and dry, and winters are cool and moist.

In a representative profile the surface layer is light brownish gray, moderately alkaline fine sandy loam about 12 inches thick. The underlying material is light brownish gray, moderately alkaline, stratified fine sand, sand, and very fine sandy loam extending to a depth of more than 60 inches (fig. 7).

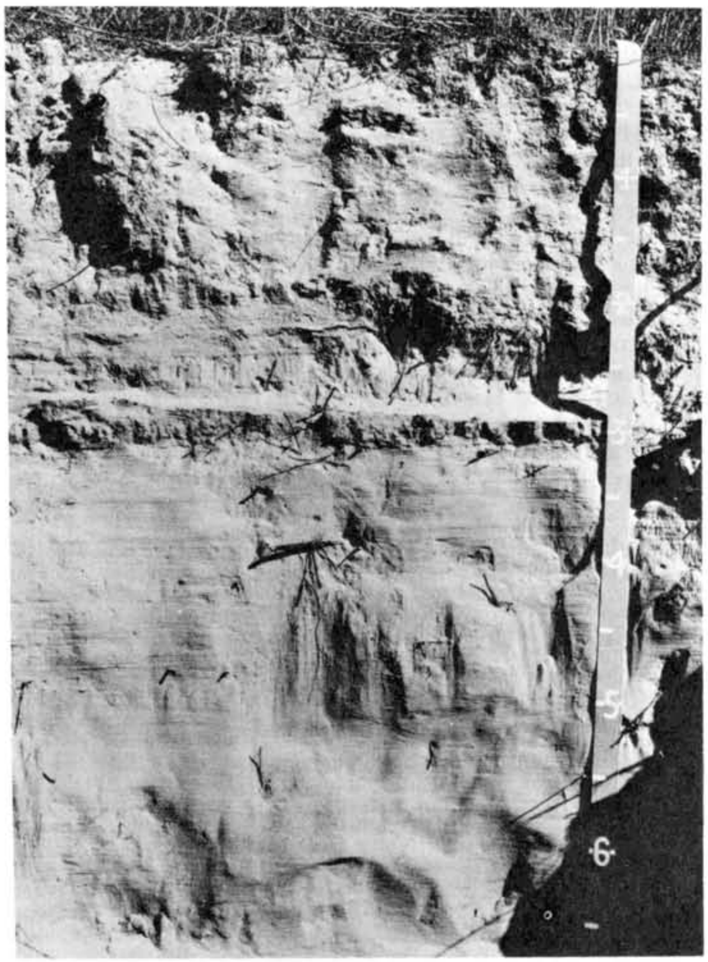

Figure 7.—Profile of a Metz soil. A 2-inch layer of silt is at a depth of 3 feet.

Permeability is moderate, but it becomes rapid at a depth of more than 48 inches in some places. The available water capacity is 4 to 6 inches, depending upon the amount of stratification. Roots penetrate to a depth of more than 60 inches.

Metz soils are mostly used for irrigated row crops, pasture, and range. They have a limited use for dryland grain.

Representative profile of Metz fine sandy loam, about 8 miles southeast of Salinas; from U.S. Highway 101 on Samovia Road, 1.15 miles to end of pavement, 0.65 mile SW on road continuation, 0.2 mile NW on farm road, then 30 feet west and 100 feet north in corner of field.

Ap—0 to 12 inches; light brownish gray (2.5Y 6/2) fine sandy loam, dark grayish brown (2.5Y 4/2) when moist; massive; hard, friable, nonsticky and nonplastic; common very fine roots in the upper 2 inches, few very fine roots below a depth of 2 inches; many very fine interstitial pores and very few fine tubular pores; compacted by tillage; moderately alkaline; abrupt wavy boundary.

C1—12 to 29 inches; light brownish gray (2.5Y 6/2) fine sand, dark grayish brown (2.5Y 4/2) when moist; massive; soft, very friable, nonsticky and nonplastic; very few very fine roots; many very fine interstitial pores; discontinuous sand lenses 1 to 2 inches thick in upper part of horizon; very slightly effervescent; moderately alkaline; clear smooth boundary.

C2—29 to 38 inches; light brownish gray (2.5Y 6/2) sand, grayish brown (2.5Y 5/2) when moist; single grained; loose (dry and moist), nonsticky and nonplastic; very few very fine roots; many very fine interstitial pores; some gravel and lenses of very dark gray silty clay 2 to 5 inches thick that have many very fine and few fine roots; very slightly effervescent; moderately alkaline; gradual smooth boundary.

IIC3—38 to 52 inches; light brownish gray (2.5Y 6/2) very fine sandy loam, olive brown (2.5Y 4/4) when moist; weak coarse prismatic structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; many very fine interstitial pores and common very fine tubular pores; faint lenses of brown silt loam in the middle of horizon; strongly effervescent with disseminated lime; moderately alkaline; abrupt smooth boundary.

IIIC4—52 to 118 inches; light brownish gray (2.5Y 6/2) fine sand, dark grayish brown (2.5Y 4/2) when moist; single grained; loose (dry and moist), nonsticky and nonplastic; no roots observed; many very fine interstitial pores; very slightly effervescent; moderately alkaline.

The A horizon is grayish brown, brown, light brownish gray, pale brown, or light yellowish brown. Texture is sand, loamy sand, fine sandy loam, or silt loam and strata of loam, silt, and clay. Consistence is generally soft, but it is hard in places because of tillage. Reaction ranges from neutral to moderately alkaline. The horizon is weakly calcareous to moderately calcareous in places.

The C horizon is grayish brown, light brownish gray, pale brown, brown, or light gray. Texture is stratified sand, fine sand, very fine sandy loam, and loamy fine sand. The C2 and IIC3 horizons are commonly moderately calcareous to strongly calcareous.

Me—Metz loamy sand. This is a nearly level soil on flood plains, commonly adjacent to the Salinas and San Antonio Rivers. This soil has a profile similar to the one described as representative of the series, but the surface layer is loamy sand. Slopes are mostly about 1 percent.

Included with this soil in mapping were areas of Metz fine sandy loam.

Runoff is slow, and the erosion hazard is slight. If unprotected, this soil is subject to soil blowing.

This soil is used for some irrigated row crops and pasture. A few areas are used for dryland grain. Capability unit IIIs–4 (14) ; range site not assigned.

Mf—Metz fine sandy loam. This is a nearly level soil on flood plains. It has the profile described as representative of the series.

Included with this soil in mapping were small areas of Tujunga, Pacheco, Mocho, and Pico soils, other Metz soils, and Psamments and Fluvents, occasionally flooded.

Runoff is slow, and the erosion hazard is slight. If unprotected, the soil is subject to soil blowing.

This Metz soil is used mainly for irrigated row crops. Capability unit IIs–4 (14) ; range site not assigned.

Mg—Metz complex. This complex consists of undulating to gently rolling soils mainly along drainageways and on modified sand dunes. These soils were so intermingled that it was not feasible to map them separately at the scale used. They have profiles similar to the one described as representative of the series, but the texture of the surface layer is variable. Textures include sand, loamy sand, silt loam, and fine sandy loam that is gravelly or cobbly in places. Currently, this complex is rarely flooded, but before dams and other protection were provided, it was flooded every 2 or 3 years. Slopes are 2 to 9 percent.

Runoff is slow, and the erosion hazard is slight. If unprotected, these soils are subject to soil blowing.

This complex is used mostly for range. A few areas are used for dryland grain. Capability unit IVe–4 (14) ; range site not assigned.

Millsholm Series

The Millsholm series consists of well drained soils that formed on uplands in material weathered from shale or sandstone. Slopes are 30 to 75 percent. The vegetation consists mainly of annual grasses. Scattered oaks and digger pine are in some areas. The elevation is 700 to 3,400 feet. The mean annual air temperature is 58° to 60° F, and the annual precipitation is 15 to 45 inches. The frost-free season is 200 to 300 days. Summers are hot and dry, and winters are cool and moist.

In a representative profile the surface layer is pale brown, slightly acid and neutral loam 17 inches thick. It is underlain by fractured shale.

Permeability is moderate to moderately slow, and the available water capacity is 2 to 4 inches. Roots penetrate to a depth of 10 to 20 inches.

Millsholm soils are used mostly for range. Some areas are used for watershed and wildlife habitat.

Representative profile of Millsholm loam, 30 to 75 percent slopes, approximately 12.2 miles south of Jamesburg along Tassajera Road, 0.2 mile SE along Horse Pasture Trail, and about 55 feet north of trail, in SE¼SE¼ sec. 29, T. 19 S., R. 4 E.

A1—0 to 6 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) when moist; moderate medium and fine granular and moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; many very fine interstitial pores; 10 percent gravel; slightly acid; clear wavy boundary.

B2—6 to 17 inches; pale brown (10YR 6/3) gravelly loam,

brown (10YR 4/3) when moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; many very fine interstitial pores and few very fine tubular pores; 15 percent gravel; neutral; abrupt wavy boundary.

IIR—17 to 20 inches; fractured shale; some soil material and very fine roots in fractures.

The A1 horizon is generally pale brown, but in places is grayish brown, light brownish gray, brown, yellowish brown, or light yellowish brown. Texture is loam, clay loam, or silty clay loam, and reaction ranges from medium acid to neutral. Gravel content ranges from 0 to 20 percent throughout the profile. Depth to hard sandstone or shale ranges from 10 to 20 inches. Stones on the surface and rock outcrops occur in up to 3 percent of the acreage.

MhG—Millsholm loam, 30 to 75 percent slopes. This is a steep and very steep soil on mountains. It has the profile described as representative of the series.

Included with this soil in mapping, and each making up about 10 percent of the acreage, were a loam or clay loam that has more clay in the subsoil than in the surface layer; a soil that has a grayish brown and dark grayish brown surface layer; and a soil that is more than 20 inches or less than 10 inches deep to bedrock. Also included were small areas of Gazos, Gaviota, Los Osos, Reliz, and Dibble soils, areas of Rock outcrop-Xerorthents association, and soils that have a strongly acid or very strongly acid subsoil. In the area south of Burma Road on the Hunter Liggett Military Reservation, Gilroy soils on ridgetops make up 10 to 15 percent of this mapping unit.

Runoff is very rapid, and the erosion hazard is very high.

This soil is used mostly for range, watershed, and wildlife habitat. Capability unit VIIe–1(15); Shallow Loamy range site.

Mk—Millsholm-Alo association. This association consists of very steep soils on hills mainly in the eastern part of Monterey County. Slopes are 50 to 75 percent.

Millsholm soils make up about 40 percent of this association and Alo soils 20 percent, except in Priest Valley, where the association is about 40 percent Alo soils and 30 percent Millsholm soils. Millsholm soils typically have slopes of 60 to 75 percent and are in convex areas that have a southern exposure. Alo soils typically have slopes of 50 to 60 percent and are in areas that have a northern exposure. Los Osos soils on small plateaus that have a northern exposure and San Benito soils in areas that also have a northern exposure each make up about 10 percent of this association. Diablo, Nacimiento, Gaviota, and Shedd soils and rock outcrop make up about 20 percent.

Runoff is very rapid. The erosion hazard is high or very high, especially on Millsholm soils.

The soils in this association are used for range, watershed, and wildlife habitat. Capability unit VIIe–1(15); Millsholm soil in Shallow Loamy range site, Alo soil in Clayey range site.

Mm—Millsholm-Gazos complex. The soils in this complex are steep and very steep. They are on southern and western exposures of mountainsides and are so intermingled that it was not feasible to map them separately at the scale used. These soils formed in material that was derived from sandstone, shale, or schist. Slopes are 30 to 75 percent.

Millsholm soils make up about 50 percent of this complex and Gazos soils 20 percent. Millsholm soils typically have slopes of 50 to 60 percent, and Gazos soils have slopes mostly of 50 percent. The rest of this complex consists of small areas of Lopez, Reliz, and Los Osos soils that have slopes of less than 30 percent; areas of a soil that is similar to Millsholm soils, but is less than 10 inches deep to bedrock; areas of similar soils that have a mean annual temperature of less than 59° F; and areas of Rock outcrop. Deeply gullied areas and some Gilroy soils are part of this mapping unit south of Plaskett Road.

On the Millsholm soil, runoff is very rapid, and the erosion hazard is very high. On the Gazos soil, runoff is rapid, and the erosion hazard is moderate or high.

These soils are used for range, watershed, and wildlife habitat. Capability unit VIIe–1(15); Millsholm soil in Shallow Loamy range site, Gazos soil in Fine Loamy range site.

Mocho Series

The Mocho series consists of well drained soils that formed in alluvium that was derived mostly from sedimentary rocks. Slopes are 0 to 9 percent. The vegetation consists of annual grasses, forbs, and a few scattered white oaks. The elevation is 50 to 500 feet. The mean annual precipitation is 10 to 16 inches, the mean annual air temperature is about 58° F, and the frost-free season is 200 to 250 days. Summers are warm and dry, except in the northern Salinas Valley where they are foggy, and winters are cool and moist.

In a representative profile the surface layer is grayish brown, calcareous silty clay loam about 12 inches thick. The underlying material is light brownish gray, calcareous silty clay loam and silt loam extending to a depth of 68 inches or more.

Roots penetrate to a depth of more than 60 inches.

Mocho soils are used mostly for irrigated row crops in the Salinas Valley. Other areas are used for dryland crops, pasture, and range.

Representative profile of Mocho silty clay loam, 0 to 2 percent slopes, NE of King City, about 2.5 miles NE on Bitterwater Road from the Southern Pacific Railroad crossing and 1,700 feet SE on farm road, then 100 feet SW into field.

Ap1—0 to 7 inches; grayish brown (2.5Y 5/2) silty clay loam, very dark grayish brown (2.5Y 3/2) when moist; moderate medium subangular blocky structure; hard, firm, sticky and plastic; many very fine and fine roots; very few very fine tubular pores and common very fine interstitial pores; slightly effervescent with disseminated lime; moderately alkaline; clear smooth boundary.

Ap2—7 to 12 inches; grayish brown (2.5Y 5/2) silty clay loam, very dark grayish brown (2.5Y 3/2) when moist; strong very coarse and medium angular blocky structure; hard, firm, sticky and plastic; many very fine and fine and common medium roots; common very fine and fine and few medium tubular pores; slightly effervescent with disseminated lime; moderately alkaline; abrupt wavy boundary.

C1ca—12 to 21 inches; light brownish gray (2.5Y 6/2) silty clay loam, light olive brown (2.5Y 5/4) when moist; mixed with grayish brown (2.5Y 5/2) silt; weak coarse angular blocky structure; slightly hard, friable, sticky and plastic; many very fine and fine and few medium roots; many very fine and fine and common medium tubular pores; strongly effervescent with lime in soft filaments; moderately alkaline; abrupt smooth boundary.

C2—21 to 24 inches; light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) when moist; massive; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine and common medium tubular pores; slightly effervescent with disseminated lime; moderately alkaline; abrupt smooth boundary.

C3—24 to 45 inches; light brownish gray (2.5Y 6/2) light silty clay loam, dark grayish brown (2.5Y 4/2) when moist; massive; slightly hard, friable, sticky and plastic; many very fine roots; many very fine and fine and few medium tubular pores; slightly effervescent with disseminated lime; moderately alkaline; clear smooth boundary.

C4—45 to 68 inches; light brownish gray (2.5Y 6/2) heavy silt loam, dark grayish brown (2.5Y 4/2) when moist; massive; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine and common fine tubular pores; slightly effervescent with disseminated lime; moderately alkaline.

The A horizon is grayish brown or dark grayish brown, and texture is very fine sandy loam, loam, silt loam, clay loam, or silty clay loam. Reaction is mildly alkaline or moderately alkaline. The A horizon is slightly to strongly effervescent and has disseminated lime.

The C horizon is grayish brown, light brownish gray, or light gray and is stratified with fine sandy loam, loam, silt loam, and silty clay loam. This horizon is slightly to strongly effervescent and has lime in fine filaments. The concentration of secondary lime is at a depth of 12 to 30 inches.

MnA—Mocho silt loam, 0 to 2 percent slopes. This soil is on flood plains. It has a profile similar to the one described as representative of the series, but the surface layer is silt loam.

Included with this soil in mapping were areas of Docas and Sorrento soils in the San Lucas-San Ardo areas and in Peachtree Valley. Included along the Salinas River were areas of Salinas, Pico, Metz, and Pacheco soils and Mocho silty clay loam, 0 to 2 percent slopes. Small areas of Mocho loam and fine sandy loam were also included.

Permeability is moderate, and the available water capacity is 10 to 12 inches. Runoff is slow, and the erosion hazard is slight.

This soil is used intensively for vegetable and field crops. Capability units I(14), IIIc-1(15); range site not assigned.

MoA—Mocho silty clay loam, 0 to 2 percent slopes. This is a nearly level soil on flood plains. It has the profile described as representative of the series.

Included with this soil in mapping were areas of Cropley soils making up about 10 percent of the acreage. Also included were small areas of Metz, Pico, and Salinas soils and Mocho silt loam, 0 to 2 percent slopes, along the Salinas River. Docas and Sorrento soils were included near the town of San Ardo and in Peachtree Valley.

Permeability is moderately slow, and the available water capacity is 11 to 13 inches. Runoff is slow, and the erosion hazard is minimal.

This soil is used intensively for vegetable and field crops in the Salinas Valley. In Peachtree Valley it is used for dryland grain and some range. Capability units I(14), IIIc-1(15); range site not assigned.

MoC—Mocho silty clay loam, 2 to 9 percent slopes. This is a gently sloping to moderately sloping soil on alluvial fans. It has a profile similar to the one described as representative of the series, but the thickness of the surface layer commonly ranges from 12 to 20 inches.

Included with this soil in mapping were areas of Docas, Sorrento, Rincon, Salinas, and Cropley soils.

Permeability is moderately slow, and the available water capacity is 11 to 13 inches. Runoff is medium, and the erosion hazard is slight.

This soil is used for irrigated row crops and pasture. In Peachtree Valley, it is used for pasture and dryland grain. Capability unit IIe-1(14); range site not assigned.

Montara Series

The Montara series consists of well drained soils on uplands. These soils formed in material underlain by serpentine. Slopes are 15 to 75 percent. The vegetation is mainly annual grasses, forbs, and some brush. The elevation is 500 to 3,000 feet. The mean annual precipitation is 10 to 25 inches, the mean annual air temperature ranges from 57° to 62° F, and the frost-free season is 300 days on the coast and 150 to 175 days elsewhere. Summers are hot and dry, and winters are cool and moist.

In a representative profile the soil is dark grayish brown and dark brown, mildly alkaline clay loam. It is underlain by greenish gray serpentine at a depth of 10 inches.

Permeability is moderately slow, and the available water capacity is 2 to 4 inches. Roots penetrate to a depth of 10 to 20 inches.

Montara soils are used for range, watershed, and wildlife habitat.

Representative profile of Montara clay loam, in an area of Montara-Rock outcrop complex, about 1 mile NE from the intersection of State Highways 41 and 46, then 4 miles NNW of road from State Highway 41 and ½ mile north of county line to Stone Corral Canyon, west up hill about 1,000 feet in SW¼NW¼ sec. 31 (projected), T. 24 S., R. 16 E.

A11—0 to 4 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (2.5Y 3/2) when moist; moderate medium and coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many very fine and common fine roots; common very fine tubular pores; mildly alkaline; clear wavy boundary.

A12—4 to 10 inches; dark brown (10YR 4/3) clay loam, dark brown (10YR 3/3) when moist; weak medium angular and subangular blocky structure; hard, friable, sticky and plastic; common very fine roots; common very fine tubular pores; mildly alkaline; clear irregular boundary.

R—10 to 15 inches, greenish gray (5BG 5/1) serpentine; dark yellowish brown (10YR 4/4) and brownish yellow (10YR 6/6) coatings on fractures.

The A1 horizon is very dark grayish brown, dark grayish brown, or dark brown, and texture is light clay loam, clay loam, or heavy loam. Reaction ranges from neutral to moderately alkaline, and the soil is calcareous in places. About 5 to 15 percent of the surface is covered by cobblestones or stones. Depth to bedrock commonly is 10 to 15 inches, but ranges to 20 inches.

Mp—Montara-Rock outcrop complex. This mapping unit is on hills and mountains. The Montara soil has slopes of 15 to 75 percent, but slopes are mostly about 45 percent. The Rock outcrop commonly is serpentine or metamorphic rocks covering an area of a few hun-

dred square feet to about 5 acres. Most of the outcrop is barely exposed or only a few feet above the surface. The soil and rock outcrop were so intermingled that it was not feasible to map them separately at the scale used.

Montara soils make up 40 percent of the complex and Rock outcrop 25 percent. The rest consists of small areas of Climara, Gilroy, Henneke, Nacimiento, or Alo soils; soils that are less than 10 inches or more than 20 inches deep to bedrock; and soils that are brown, reddish brown, or red. Also included were some areas where sheet or rill erosion is moderate or severe and many areas of seeps or wet areas and springs.

On the Montara soil, runoff is medium or rapid, and the erosion hazard is moderate or high. Fertility is low or very low because of the low calcium to magnesium ratio, which is commonly less than 2. On the Rock outcrop, runoff is very rapid, but the erosion hazard is slight.

This complex is used for range, wildlife habitat, and watershed. Capability unit VIIs–1(15); Serpentine range site.

Nacimiento Series

The Nacimiento series consists of well drained soils on uplands. These soils formed in material underlain by calcareous sandstone or shale. Slopes are 9 to 75 percent. The vegetation consists of annual grasses, forbs, and scattered oak. The elevation is 200 to 3,500 feet. The mean annual precipitation is 12 to 30 inches, the mean annual air temperature is about 60° F, and the frost-free season is about 250 days. Summers are hot and dry, and winters are cool and moist.

In a representative profile the surface layer is dark grayish brown and brown, calcareous silty clay loam about 18 inches thick. Below this is pale brown, calcareous silty clay loam. Weathered calcareous shale is at a depth of 31 inches.

Permeability is moderately slow, and the available water capacity is 4 to 7.5 inches. Roots penetrate to a depth of 24 to 40 inches.

Nacimiento soils are used mostly for dryland grain and range.

Representative profile of Nacimiento silty clay loam, 30 to 50 percent slopes, about 1.7 miles south of the entrance to Camp Roberts East Garrison, 0.2 mile south past cattle guard, then east 0.4 mile up hill on road to site about 25 feet south in NW¼NE¼ sec. 36, R. 24 S., R 11 E.

A11—0 to 2 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) when moist; weak medium subangular blocky structure that parts to moderate medium granular; slightly hard, very friable, sticky and plastic; many fine and very fine roots; many very fine and fine tubular and interstitial pores; very slightly effervescent with disseminated lime; moderately alkaline; clear smooth boundary.

A12—2 to 11 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) when moist; moderate medium subangular blocky structure; slightly hard, very friable, sticky and plastic; many very fine and fine roots; common very fine and fine tubular and interstitial pores; slightly effervescent with disseminated lime; moderately alkaline; clear wavy boundary.

A13—11 to 18 inches; brown (10YR 5/3) silty clay loam, dark brown (10YR 4/3) when moist; moderate medium subangular blocky structure; slightly hard, very friable, sticky and plastic; common very fine and fine roots; common very fine tubular pores; strongly effervescent with disseminated lime; moderately alkaline; diffuse wavy boundary.

C1ca—18 to 31 inches; pale brown (10YR 6/3) silty clay loam, brown (10YR 5/3) when moist; massive; hard, friable, sticky and plastic; common very fine interstitial pores; violently effervescent with lime in filaments and soft masses; moderately alkaline; diffuse wavy boundary.

C2r—31 to 40 inches; calcareous weathered shale.

The A1 horizon is dark grayish brown, grayish brown, or brown, and texture is silty clay loam or clay loam. Structure is granular or subangular blocky. The Cca horizon is pale brown, light yellowish brown, or very pale brown, and texture is loam, silt loam, silty clay loam, or clay loam. This horizon commonly has enough lime to be strongly or violently effervescent. Depth to bedrock ranges from 24 to 40 inches.

NaD—Nacimiento silty clay loam, 9 to 15 percent slopes. This is a gently rolling to rolling soil on uplands. Slopes are mostly about 10 percent.

Included with this soil in mapping were small areas of Shedd, Diablo, Los Osos, Linne, and Chamise soils and small areas of Rincon and Mocho soils on the toe slopes. Also included, and making up about 20 to 30 percent of the acreage, was a soil that is very similar to this Nacimiento soil, but has a surface layer that is grayish brown when moist.

Runoff is medium, and the erosion hazard is moderate.

This soil is used mostly for dryland grain and range. Capability unit IIIe–1(15); Clayey range site.

NaE—Nacimiento silty clay loam, 15 to 30 percent slopes. This is a moderately steep soil on uplands. Slopes are mostly about 20 percent.

Included with this soil in mapping were small areas of Linne, Shedd, Diablo, and San Benito soils and areas of Rincon, Chamise, and Lockwood soils on toe slopes. Also included, and making up about 20 to 30 percent of the acreage, was a soil that is very similar to this Nacimiento soil, but has a grayish brown surface layer when moist. Areas where sheet erosion is moderate and severe and soils that are less than 24 inches deep to bedrock were also included.

Runoff is medium, and the erosion hazard is moderate.

This soil is used for dryland grain and range. Capability unit IVe–1(15); Clayey range site.

NaF—Nacimiento silty clay loam, 30 to 50 percent slopes. This is a steep soil on uplands. It has the profile described as representative of the series. Slopes are mostly 40 percent.

Included with this soil in mapping, and making up about 30 percent of the acreage, were areas of a soil that is very similar to this Nacimiento soil, but has a surface layer that is grayish brown when moist. Also included were small areas of Alo, Diablo, Linne, San Benito, and Los Osos soils and Rincon soils on toe slopes; a few areas that have slopes of up to 60 percent; some areas that have moderate sheet erosion; and some soils that are less than 24 inches or more than 40 inches deep to bedrock. This soil has the potential to develop small landslips, especially when it is saturated after prolonged periods of wet weather.

Runoff is rapid, and the erosion hazard is high.

This soil is used mostly for range. Capability unit VIe-1(15); Clayey range site.

NaG—Nacimiento silty clay loam, 50 to 75 percent slopes. This is a very steep soil on uplands. Slopes are mostly 55 to 65 percent.

Included with this soil in mapping were small areas of Alo, Shedd, San Benito, Diablo, and Linne soils, soils that are less than 24 inches deep to bedrock, many small areas of landslides, and areas where sheet erosion is moderate and severe. Also included, and making up about 30 to 40 percent of the acreage, was a soil that is very similar to this Nacimiento soil, but has a surface layer that is grayish brown when moist.

Runoff is very rapid, and the erosion hazard is high. This soil is used for range. Capability unit VIIe-1 (15); Clayey range site.

NbF—Nacimiento-Los Osos complex, 30 to 50 percent slopes. This complex consists of steep soils on uplands. These soils were so intermingled that it was not feasible to map them separately at the scale used.

Nacimiento soils make up about 40 percent of this complex, Los Osos soils 20 percent, and San Benito soils 20 percent. The rest is Chamise, Shedd, Diablo, Linne, and Rincon soils; small areas of similar soils that are less than 20 inches deep to bedrock; and areas of landslips.

Runoff is rapid, and the erosion hazard is high.

This complex is used mostly for range, watershed, and wildlife habitat. These soils have a potential to develop landslips. Capability unit VIe-1(15); Nacimiento soil in Clayey range site, Los Osos soil in Fine Loamy range site.

NbG—Nacimiento-Los Osos complex, 50 to 75 percent slopes. This complex consists of very steep soils on uplands. These soils were so intermingled that it was not feasible to map them separately at the scale used.

Nacimiento soils make up about 40 percent of this complex and Los Osos soils 20 percent. San Benito soils make up 20 percent. The rest consists of Chamise, Shedd, Diablo, and Linne soils; a soil that is very similar to Nacimiento soils, but is less than 20 inches deep to bedrock; and areas of landslips. Included in the Portuguese Canyon area, and making up about 30 percent of this complex, were Chamise soils that have a northern exposure.

Runoff is very rapid, and the erosion hazard is high. This complex is used for range, wildlife habitat, and watershed. Capability unit VIIe-1(15); Nacimiento soil in Clayey range site, Los Osos soil in Fine Loamy range site.

Narlon Series

The Narlon series consists of somewhat poorly drained soils that formed on uplands in soft marine sediments. Slopes are 2 to 30 percent. The vegetation commonly is Monterey pine, but there is some manzanita and huckleberry and lesser amounts of cypress, grass, sedge, ceanothus, and wild iris. The elevation is 20 to 700 feet. The mean annual precipitation is 17 to 20 inches, the mean annual air temperature is about 56° F, and the frost-free season is 300 to 350 days. Summers are warm and dry or are often foggy, and winters are cool and moist.

In a representative profile the surface layer is gray, medium acid loamy fine sand about 3 inches thick. The subsurface layer is white, mottled, medium acid and slightly acid loamy fine sand 10 inches thick. The subsoil is light brownish gray, gray, and light gray, mottled, very strongly acid clay 40 inches thick. The substratum is mottled white, extremely acid weathered sandstone.

Permeability is very slow, and the available water capacity is 2 to 3 inches. Most roots penetrate to a depth of 12 to 24 inches, but some tree roots penetrate very deeply into cracks.

Narlon soils are used for woodland, homesites, and recreation. One area in Del Monte Forest (17 Mile Drive) is preserved as a unique natural history site. It is known locally as the "Pigmy Forest."

Representative profile of Narlon loamy fine sand, 2 to 9 percent slopes, in the Del Monte Forest about 525 feet north from the junction of Ronda Road and Viscaino Road; 100 feet east of Viscaino Road, 125 feet south of a barrier on the bridle trail and 25 feet west of the bridle trail.

O1—2 inches to 0; partly decomposed pine needles and some pine bark; very strongly acid; abrupt wavy boundary.

A1—0 to 3 inches; gray (10YR 6/1) loamy fine sand, grayish brown (10YR 5/2) when moist; moderate fine and medium crumb structure; soft, very friable, nonsticky and nonplastic; common coarse and fine and many very fine roots; few fine and common very fine tubular pores and many very fine interstitial pores; medium acid; clear wavy boundary.

A21—3 to 7 inches; white (10YR 8/1) loamy fine sand, light brownish gray (2.5Y 6/2) when moist; common fine faint gray (10YR 6/1) and light gray (10YR 7/1) mottles and few fine faint pale brown (10YR 6/3) mottles, common fine faint gray (10YR 5/1) mottles and few fine distinct yellowish brown (10YR 5/6) mottles when moist; massive; soft, friable, nonsticky and nonplastic; common very fine, fine, and medium roots; many very fine interstitial pores; medium acid; clear smooth boundary.

A22—7 to 13 inches; white (10YR 8/1) loamy fine sand, light gray (2.5Y 7/2) when moist; many medium distinct light yellowish brown (10YR 6/4, moist and dry) mottles; massive; soft, very friable, nonsticky and nonplastic; common very fine and medium roots; many very fine interstitial pores; slightly acid; abrupt irregular boundary.

B21t—13 to 23 inches; light brownish gray (2.5Y 6/2) clay, grayish brown (2.5Y 5/2) ped surfaces and yellowish brown (10YR 5/6) matrix, light olive brown (2.5Y 5/4) when moist; many coarse distinct pale brown (10YR 6/3) mottles and few fine prominent reddish brown (2.5YR 4/3) mottles, few fine distinct reddish brown (5YR 5/4) mottles when moist; strong coarse prismatic and angular blocky structure; very hard, very firm, very sticky and very plastic; many very fine exped roots; common very fine tubular pores; continuous moderately thick and thick clay films on faces of peds and lining pores; very strongly acid; gradual broken boundary.

B22t—23 to 37 inches; gray (2.5Y 6/1) clay, gray (5Y 5/1) ped surfaces and yellowish brown (10YR 5/4) matrix, light yellowish brown (10YR 6/4) when moist; many medium distinct light yellowish brown (10YR 6/4) mottles and common medium prominent reddish brown (2.5YR 4/4) mottles, common medium distinct reddish brown (2.5YR 4/4) mottles when moist; strong coarse prismatic and angular blocky structure; very hard, very firm, very sticky and very plastic; many very fine exped roots; very few fine and few very fine tubular pores; continuous moderately thick and thick clay films on faces of

peds and lining pores; very strongly acid; gradual broken boundary.

B23t—37 to 53 inches; light gray (N7/0) clay, gray (5Y 6/1) faces of peds and yellowish brown (10YR 5/4) matrix, light brownish gray (2.5Y 6/2 rubbed) when moist; many coarse prominent yellow (10YR 7/6) mottles and few fine prominent reddish brown (2.5YR 4/3) mottles, common medium distinct reddish brown (2.5YR 4/4) mottles when moist; moderate coarse angular blocky structure; very hard, very firm, sticky and plastic; common very fine and medium roots; common very fine tubular pores; continuous moderately thick and thick clay films on faces of peds and lining pores; very strongly acid; clear wavy boundary.

Cr—53 to 60 inches; white (10YR 8/1) weathered sandstone, mixed strong brown, brownish yellow, and light olive brown (7.5YR 5/6, 10YR 6/6, 2.5Y 5/4) when moist; crushes to sandy clay loam; many coarse distinct yellow (10YR 7/6) and light yellowish brown (2.5Y 6/4) mottles and few fine distinct dark gray (10YR 4/1) mottles; massive; common medium and few very fine roots; clay films in relic fractures of bedrock; extremely acid.

The O horizon does not occur in some places. The A1 horizon is grayish brown, light brownish gray, or gray, and texture ranges from loamy fine sand to fine sandy loam. Reaction ranges from strongly acid to slightly acid. This horizon is 2 to 8 inches thick. The A2 horizon contains up to 15 percent concretions commonly about ¼ inch in diameter; in places other horizons also have concretions. The lower half of the A2 horizon has brownish yellow, light yellowish brown, or yellowish brown mottles.

Depth to the Bt horizon ranges from 7 to 20 inches. The Bt horizon is typically light brownish gray to light gray and gray, but ranges from yellow to reddish yellow and reddish brown. When moist, the soil material is firm or very firm. Reaction is strongly acid or very strongly acid. Thickness of the Bt horizon ranges from 13 to 40 inches.

The Cr horizon is medium acid or extremely acid sandstone, but in places it is granite or, less commonly, shale.

NcC—Narlon loamy fine sand, 2 to 9 percent slopes. This is a gently sloping and moderately sloping soil on dissected marine terraces. It has the profile described as representative of the series. The clay subsoil is at a depth of 15 to 20 inches. Slopes are mostly 3 to 6 percent.

Included with this soil in mapping were small areas of a Narlon soil that has slopes of 9 to 15 percent and areas of Tangair soils. Also included, and making up about 15 percent of the acreage, were soils that have a clay subsoil at a depth of more than 24 inches or a subsoil that is medium acid or slightly acid. Included at an elevation above 600 feet were small areas of soils that have bedrock at a depth of less than 20 inches or soils that have no clay subsoil, but have cemented sand at a depth of 10 to 20 inches.

Runoff is slow to medium, and temporary shallow ponds form in swales in wet winters. The erosion hazard is moderate.

This soil is used mostly for woodland. Some areas are used for grazing and homesites. The soil has moderate productivity for Monterey pine (site index averages about 75). The seedling mortality is low, and the windthrow hazard is severe. The equipment limitation is moderate or severe. Capability unit IVe–3(14); Claypan range site.

NcE—Narlon loamy fine sand, 15 to 30 percent slopes. This is a strongly sloping and moderately steep soil on uplands. It has a profile similar to the one described as representative of the series, but depth to the clay subsoil is 12 to 20 inches. Slopes are mostly 12 to 20 percent.

Included with this soil in mapping, and making up about 50 percent of the acreage, were small areas of Chamise, Cieneba, Tangair, Santa Lucia, Sheridan, and Santa Ynez soils; some areas of soils that have a clay or sandy clay loam subsoil at a depth of more than 24 inches; soils that have weathered granite at a depth of less than 20 inches; and soils that have no clay subsoil, but have cemented sand at a depth of 10 to 20 inches.

Runoff is medium, and the erosion hazard is moderate.

This soil is used mostly for woodland. Some areas are used for grazing.

The soil has moderately low productivity for Monterey pine (site index averages about 60). The seedling mortality is low, and the windthrow hazard is severe. The equipment limitation is severe. The productivity rating is based on the premise that trees 60 to 90 feet are common and some are up to 100 feet—heights that are attained in 80 to 100 years. Meyer's curves (*21*) could not be used directly for this species, but the species is comparable to ponderosa pine if mature trees about 100 years of age are used. Monterey pine commonly grows more rapidly in the first years than ponderosa pine. Early growth is more like coastal Douglas-fir or redwood. Capability unit VIIe–1(15); Claypan range site.

Oceano Series

The Oceano series consists of excessively drained soils that formed in eolian sands on old stabilized dunes. Slopes are 2 to 15 percent. The vegetation consists of annual grasses, forbs, and some scattered scrub oak or brush, commonly chamise. The elevation is 25 to 1,000 feet. The mean annual precipitation is 10 to 18 inches, the mean annual air temperature is 57° to 59° F, and the frost-free season is 230 to 350 days. Summers are mainly warm and dry, but they are often foggy in the northern Salinas Valley; and winters are cool and moist.

In a representative profile the surface layer is grayish brown, medium acid loamy sand about 18 inches thick. The subsoil is brown, yellowish brown, light brown, and light yellowish brown, medium acid and slightly acid loamy sand that has clay bands and is about 55 inches thick. It is underlain by very pale brown, slightly acid loamy sand that extends to a depth of more than 80 inches.

Permeability is rapid, and the available water capacity is about 4 inches. Roots penetrate to a depth of more than 60 inches.

Oceano soils are used mostly for range. Some are used, to a limited extent, for irrigated row crops, dryland grain, and sites for military maneuvers and buildings.

Representative profile of Oceano loamy sand, 2 to 15 percent slopes, about 1.5 miles north of Marina on State Highway 1; 2,500 feet ESE from the South junction of old Highway 1 and State Highway 1, about 2,600 feet NW from barns and corrals on the old Armstrong Ranch.

A11—0 to 3 inches; grayish brown (10YR 5/2) loamy sand, very dark grayish brown (10YR 3/2) when moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; many very fine roots; few medium tubular pores and common very fine interstitial pores; medium acid; clear smooth boundary.

A12—3 to 12 inches; grayish brown (10YR 5/2) loamy sand, very dark grayish brown (10YR 3/2) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; many very fine roots; few very fine tubular pores and common very fine interstitial pores; medium acid; clear smooth boundary.

A13—12 to 18 inches; grayish brown (10YR 5/2) loamy sand, dark brown (10YR 3/4) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine roots; few very fine tubular pores and common very fine interstitial pores; medium acid; gradual wavy boundary.

B1—18 to 26 inches; brown (10YR 5/3) loamy sand, dark yellowish brown (10YR 4/4) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine roots; few very fine tubular pores and common very fine interstitial pores; medium acid; clear wavy boundary.

B2—26 to 62 inches; mixed yellowish brown and light brown (10YR 5/4, 7.5YR 6/4) loamy sand, dark brown (7.5YR 4/4) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; common medium tubular pores and common very fine interstitial pores; continuous distinct clay bands throughout, 1/8 to 1/4 inch thick; hard, friable, slightly sticky, brown (7.5YR 4/4), dark brown (3/2-4/2) when moist sandy loam bands that have moderately thick clay bridges occur about 1 to 7 inches apart; medium acid; clear smooth boundary.

B3—62 to 73 inches; light yellowish brown (10YR 6/4) loamy sand, yellowish brown (10YR 5/4) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; no roots observed; common very fine interstitial pores; slightly acid; gradual smooth boundary.

C—73 to 80 inches; very pale brown (10YR 7/4) loamy sand, yellowish brown (10YR 5/6) when moist; single grained; loose (dry and moist), nonsticky and nonplastic; few very fine interstitial pores, slightly acid.

The soil generally becomes less acid with increasing depth. The A1 horizon ranges from light yellowish brown to grayish brown and dark brown, and texture is loamy sand or sand. Reaction is medium acid or slightly acid.

The B2 horizon ranges from light yellowish brown to brown, and texture is loamy sand or sand. Reaction is medium acid or slightly acid. Horizontal clay bands 1/8 to 1/4 inch thick occur at a depth of 25 to 60 inches or more. The B2 horizon appears to be much more compact than the other horizons and is slightly brittle. The clay bands are thickest and most prominent at the top of the horizon, becoming very weak, discontinuous, and indistinct in the B3 horizon.

No clay bands were observed in the C horizon. Reaction is slightly acid or neutral. The C4 horizon is loamy sand or sand.

OaD—Oceano loamy sand, 2 to 15 percent slopes. This is an undulating to rolling soil on eolian dunelike hills. It has the profile described as representative of the series.

Included with this soil in mapping were small areas of Arnold, Baywood, Garey, Elkhorn, and Lockwood soils; Oceano soils that have slopes of more than 15 percent; some soils that have a very strongly acid to strongly acid subsoil; and some areas of Dune land. Included north of the city of Marina was a small area that is underlain by a hard indurated layer at a depth of 50 to 60 inches. Near King City, where this soil is cultivated and soil blowing and water erosion have occurred, a few areas of gullies were included.

Runoff is slow to medium, and the erosion hazard is slight to moderate.

This soil is used mostly for range. It is also used for some irrigated row crops and grain and for building sites near the city of Marina. Capability units IVe-4 (14), VIe-1 (15); Sandy range site.

Pacheco Series

The Pacheco series consists of poorly drained soils that formed on flood plains in alluvium derived from sedimentary rocks. Slopes are 0 to 2 percent. The vegetation consists of annual grasses, forbs, and a few scattered oaks. The elevation is 10 to 100 feet. The mean annual precipitation is 15 to 20 inches, the mean annual air temperature is about 57° F, and the frost-free season is 250 to 300 days. Summers are mainly cool and dry, but they are often foggy in the northern Salinas Valley, and winters are cool and moist.

In a representative profile the surface layer is dark gray, slightly acid and mildly alkaline clay loam about 22 inches thick. The underlying material is grayish brown, mottled, moderately alkaline fine sandy loam to a depth of 35 inches. Below that is light brownish gray, faintly mottled, moderately alkaline loam and silty clay loam that extends to a depth of more than 60 inches (fig. 8).

Permeability is moderately slow, and the available water capacity is 10 to 12 inches. Roots penetrate to a depth of more than 60 inches. Depth to the water table is 36 to 60 inches in undrained areas.

Pacheco soils are used for row crops, mainly artichokes, broccoli, and celery.

Representative profile of Pacheco clay loam about 2 miles south of Castroville, about 1.2 miles SE on Nashua Road from its intersection with Roberts Road, and 1,800 feet NE.

Ap—0 to 8 inches; dark gray (10YR 4/1) clay loam, very dark gray (10YR 3/1) when moist; moderate medium and coarse subangular blocky structure that parts to weak medium granular; hard and very hard, friable, slightly sticky and slightly plastic; many very fine roots; few very fine tubular pores; slightly acid; clear wavy boundary.

A12—8 to 16 inches; dark gray (10YR 4/1) clay loam, very dark gray (10YR 3/1) when moist; moderate coarse subangular blocky structure; very hard, firm, slightly sticky and slightly plastic; few very fine roots; few very fine tubular pores; mildly alkaline; clear wavy boundary.

A13—16 to 22 inches; mixed dark gray and very dark gray (10YR 4/1 and 3/1) light clay loam, black (10YR 2/1) when moist; massive; extremely hard, very firm, slightly sticky and slightly plastic; few very fine roots; very few very fine tubular pores; somewhat compacted by equipment (tillage pan); mildly alkaline; abrupt wavy boundary.

IIC1g—22 to 35 inches; grayish brown (10YR 5/2) fine sandy loam, dark grayish brown (2.5Y 4/2) when moist; common fine faint gray (10YR 5/1) mottles, dark gray (10YR 4/1) when moist; moderate medium subangular blocky structure, hard, friable, slightly sticky and slightly plastic; few very fine roots; many very fine and fine tubular pores; moderately alkaline; gradual wavy boundary.

IIC2g—35 to 47 inches; light brownish gray (10YR 6/2) loam, grayish brown (10YR 5/2) when moist; common fine faint pale brown (10YR 6/3) mottles; massive; hard, friable, slightly sticky and slightly

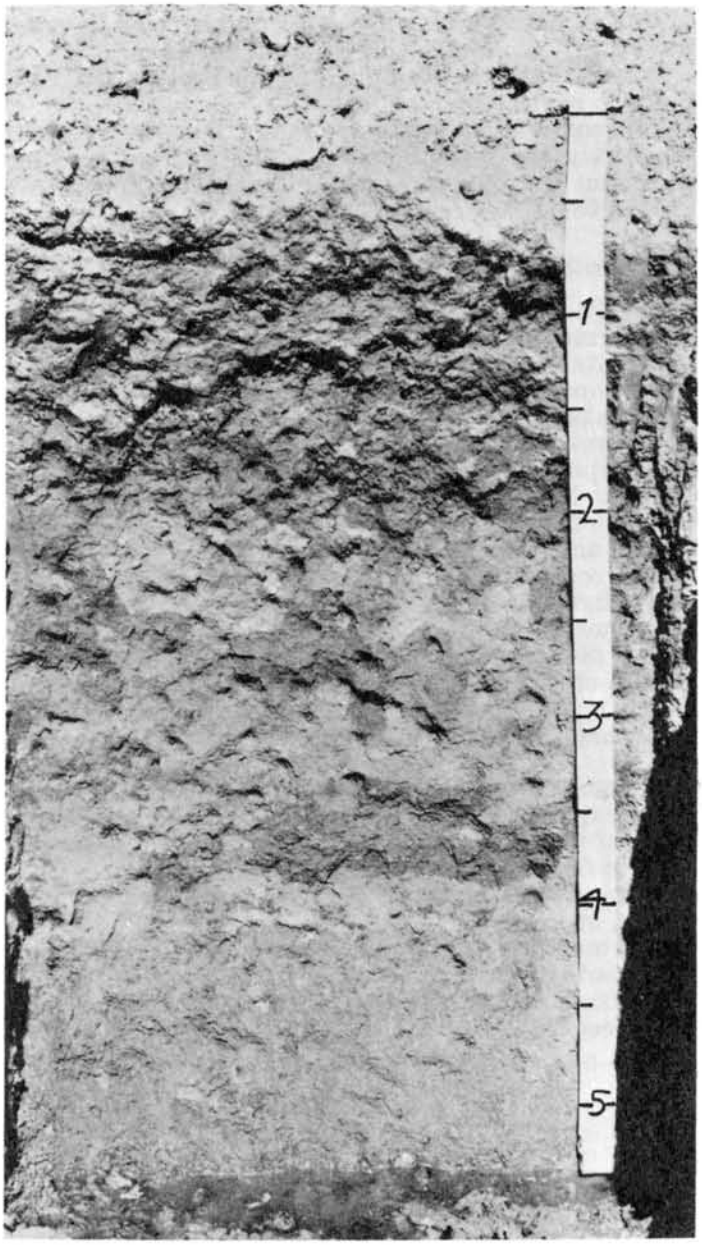

Figure 8.—**Profile of Pacheco clay loam. Water is at a depth below 5 feet.**

plastic; few very fine roots; many very fine and common fine tubular pores; slightly effervescent with disseminated lime; moderately alkaline; abrupt smooth boundary.

IIIC3g—47 to 65 inches; light brownish gray (2.5Y 6/2) silty clay loam, olive gray (2.5Y 4/2) when moist; many fine faint very dark grayish brown, dark grayish brown, and olive brown (2.5Y 3/2, 4/2, 4/4) mottles when moist; massive; extremely hard, friable, sticky and plastic; few very fine roots; many very fine and common fine tubular pores; horizon is discontinuous; very slightly effervescent with disseminated lime, strongly calcareous with lime segregated in irregularly shaped, medium sized soft masses; moderately alkaline.

The A horizon is very dark gray, dark gray, gray, dark grayish brown, or grayish brown. Some mottles are in the lower part of the A horizon and range from yellowish brown to olive brown. Texture commonly is clay loam, but ranges from fine sandy loam, loam, and silt loam to silty clay loam. Reaction ranges from slightly acid to moderately alkaline. The A horizon is 15 to 28 inches thick. In some places it is slightly effervescent and has disseminated lime.

The C horizon typically is grayish brown and gray to light brownish gray, but ranges to dark grayish brown. Mottles range from light olive brown to strong brown in hue of 2.5Y to 7.5YR. The C horizon commonly is stratified and has a texture of fine sandy loam, very fine sandy loam, sandy loam, loam, silt loam, clay loam, or silty clay loam. Reaction is mildly alkaline or moderately alkaline. The horizon commonly has enough disseminated lime to be slightly or strongly effervescent.

A B2 horizon occurs in some places.

Pa—Pacheco clay loam. This is a nearly level soil on flood plains. It has the profile described as representative of the series.

Included with this soil in mapping were small areas of Salinas, Cropley, Mocho, Clear Lake, Pico, and Metz soils. Included near sloughs or drains were some soils that have very high organic-matter content or that have the water table near the surface.

Runoff is very slow, and erosion is not generally a problem. Roots commonly can penetrate to a depth of more than 60 inches, but some roots are limited by the water table at a depth of 36 to 60 inches.

Pacheco soils are used for row crops, primarily artichokes, broccoli, and celery. Capability unit IIw–2(14); range site not assigned.

Pb—Pacheco silty clay loam, occasionally flooded. This is a nearly level soil on flood plains. It is subject to flooding in about 3 out of every 10 years. Many channels are 1 to 3 feet deep and 50 to 100 feet apart. Recent deposition has occurred in much of the area, and thickness of the deposits ranges from 1 to 3 inches to 10 to 18 inches. The vegetation consists of salt grasses, annual grasses, and forbs.

Included with this soil in mapping were small areas of Sorrento, Salinas, Cropley, and Clear Lake soils. Also included, and each making up about 20 percent of the acreage, were an overwash of light brownish gray loam or sandy loam 6 to 15 inches thick and a soil that is similar to this Pacheco soil, but is sandy loam or loamy sand. A few barren areas that have a very high concentration of salts were also included.

Runoff is slow, and the erosion hazard is slight. Although it is subject to flooding, this soil is drained, and roots can penetrate to a depth of more than 60 inches.

This soil is used for pasture and dryland grain. Capability unit IIIw–2(15); range site not assigned.

Parkfield Series

The Parkfield series consists of well drained soils that formed on terraces in alluvium derived from basic igneous, serpentine, and sedimentary rocks. Slopes are 2 to 30 percent. The vegetation consists of annual grasses, forbs, and a few scattered blue oak. The elevation is 1,000 to 2,000 feet. The mean annual precipitation is 13 to 20 inches, the mean annual air temperature is 58° to 60° F, and the frost-free season is 150 to 200 days. Summers are hot and dry, and winters are cool and moist.

In a representative profile the surface layer is brown, medium acid and slightly acid clay about 14 inches

thick. The subsoil is dark brown, neutral clay 10 inches thick. The substratum is pale olive, neutral gravelly loam.

Permeability is slow. Roots penetrate to a depth of 20 to 36 inches.

Parkfield soils are used for range and dryland grain.

Representative profile of Parkfield clay, 2 to 9 percent slopes, about 2 miles SE of Parkfield in the north corner of SW¼NE¼ sec. 31, T. 22 S., R. 15 E.

Ap—0 to 4 inches; brown (7.5YR 4/2) clay, dark brown (7.5YR 3/2) when moist; moderate medium subangular blocky and granular structure; hard, friable, very sticky and plastic; common very fine roots; many very fine tubular pores; medium acid; clear smooth boundary.

A12—4 to 14 inches; brown (7.5YR 4/2) clay, dark brown (7.5YR 3/2) when moist; moderate coarse angular blocky structure; hard, friable, very sticky and very plastic; common very fine roots; many very fine tubular pores; common thin clay films lining pores; slightly acid; clear wavy boundary.

B2t—14 to 24 inches; dark brown (7.5YR 3/2) clay, dark brown (7.5YR 3/2) when moist; moderate medium angular blocky structure; extremely hard, friable, sticky and very plastic; common very fine roots; common very fine tubular pores; continuous thin clay films lining pores and common thick clay films on faces of peds; neutral; abrupt smooth boundary.

IIC—24 to 62 inches; pale olive (5Y 6/3), semi-consolidated conglomerate gravelly loam; extremely firm; neutral.

The A horizon is brown, dark brown, grayish brown, or dark grayish brown. Texture is clay, clay loam, or silty clay loam that is about 5 percent pebbles. A few areas have 10 to 25 percent pebbles. Structure is moderate and strong subangular blocky. Reaction ranges from medium acid to neutral.

The Bt horizon ranges from brown or dark brown to yellowish brown or dark yellowish brown, but it is dark reddish brown (5YR 3/3) in a few areas. Texture is silty clay or clay, and some areas are gravelly. Structure is subangular blocky, angular blocky, or prismatic. Reaction is neutral to moderately alkaline. When the soil is dry, cracks at least ¼ to ½ inch wide extend to a depth of 20 inches.

Depth to the C horizon ranges from 20 to 36 inches.

PcC—Parkfield clay, 2 to 9 percent slopes. This is an undulating and gently rolling soil on terraces. It has the profile described as representative of the series. Slopes are mostly 5 percent.

Included with this soil in mapping were small areas of Alo, Mocho, Nacimiento, Climara, and Montara soils and Xerorthents, dissected, and Xerorthents, loamy. Also included were areas of a soil that is similar to this Parkfield soil, but has a very gravelly subsoil, which makes up about 15 percent of the mapping unit, and a soil that is less than 24 inches deep to weakly cemented material, which makes up about 10 percent.

Runoff is medium, and the erosion hazard is slight. Roots can penetrate to a depth of 24 to 36 inches. The available water capacity is 3 to 6 inches.

This soil is used for dryland grain and range. Capability unit IIIe-5(15); Clayey range site.

PcE—Parkfield clay, 15 to 30 percent slopes. This is a moderately steep soil on terrace breaks. It has a profile similar to the one described as representative of the series, but several inches of soil material have been removed from the original surface layer by erosion. The soil commonly is 20 to 24 inches deep to the cemented substratum, and 10 to 20 percent rounded pebbles and cobbles are throughout the profile. Slopes are mostly about 20 percent.

Included with this soil in mapping were small areas of Nacimiento, Linne, Alo, and Millsholm soils. Also included were soils that are very similar to this Parkfield soil, but only 10 to 20 inches deep, and small areas of Fluvents and Xerorthents.

Runoff is rapid, and the erosion hazard is high. Roots can penetrate to a depth of 20 to 30 inches. The available water capacity is 2 or 3 inches.

This soil is used mostly for range. A few areas are used for dryland grain. Capability unit VIe-1(15); Clayey range site.

Pfeiffer Series

The Pfeiffer series consists of well drained soils on uplands. These soils formed in material underlain by metamorphic rock, acid igneous rock, and sandstone. Slopes are 2 to 85 percent. The vegetation consists of annual grasses and forbs, a few scattered oaks, and small amounts of brush. The elevation is 50 to 3,000 feet. The mean annual precipitation is 25 to 55 inches, the mean annual air temperature is 57° to 60° F, and the frost-free season ranges from 200 to 280 days. Summers are typically hot and dry, but some areas are occasionally warm and foggy; winters are cool and moist.

In a representative profile the surface layer is dark yellowish brown and brown, neutral and slightly acid gravelly coarse sandy loam about 36 inches thick. The subsoil is strong brown, slightly acid gravelly coarse sandy loam 24 inches thick. Weathered acid igneous bedrock is at a depth of 60 inches.

Permeability is moderately rapid.

Pfeiffer soils have a very limited use for grazing. They are also used for watershed, wildlife habitat, and recreation.

Representative profile of Pfeiffer gravelly coarse sandy loam, in an area of Pfeiffer-Rock outcrop complex, about 350 feet down a ridge and about 100 feet SE on a side slope south from Nacimiento-Fergusson Road; about 1 mile slightly SSW from Nacimiento Guard Station Forest Service, about 750 feet west, and 300 feet south from NE corner of NE¼NE¼ sec. 30, T, 22 S., R. 5 E.

A11—0 to 6 inches; dark yellowish brown (10YR 4/4) gravelly coarse sandy loam, dark brown (10YR 3/3) when moist; moderate fine granular structure; soft and slightly hard, friable, nonsticky and nonplastic; many fine roots; many very fine and fine interstitial pores; 20 percent angular gravel mostly ⅛ to ¾ inch in diameter, but ranging to 2½ inches; neutral; clear wavy boundary.

A12—6 to 16 inches; brown (10YR 4/3) gravelly coarse sandy loam, dark brown (10YR 3/3) when moist; moderate medium and fine granular structure and weak very coarse subangular blocky structure; soft, friable, nonsticky and nonplastic; common fine roots; many very fine interstitial pores and common fine tubular pores; 25 percent angular gravel mostly ⅛ to ¾ inch in diameter, but ranging to 2½ inches; slightly acid; clear wavy boundary.

A13—16 to 24 inches; brown (10YR 4/3) gravelly coarse sandy loam, dark brown (7.5YR 3/3) when moist; moderate fine crumb structure; soft, friable, nonsticky and nonplastic; common very fine roots; many fine interstitial pores and common fine tubular pores; 30 percent angular gravel mostly ⅛ to ¾ inch in diameter, but ranging to 2½ inches; slightly acid; clear wavy boundary.

A14—24 to 36 inches; brown (10YR 4/3) gravelly coarse sandy loam, dark brown (7.5YR 3/3) when moist; massive; soft, friable, nonsticky and nonplastic; common very fine roots; many fine interstitial pores and common fine tubular pores; 30 percent angular gravel mostly ⅛ to ¾ inch in diameter, but ranging to 2½ inches; slightly acid; gradual wavy boundary.

B21—36 to 55 inches; strong brown (7.5YR 5/6) gravelly coarse sandy loam, dark brown (7.5YR 3/3) when moist; massive; soft, friable, nonsticky and nonplastic; common very fine roots; many fine interstitial pores and common fine tubular pores; 45 percent angular gravel mostly ¼ inch to 2 inches in diameter and 5 percent cobblestones; slightly acid; gradual wavy boundary.

B22—55 to 60 inches; strong brown (7.5YR 5/6) very gravelly coarse sandy loam, dark brown (7.5YR 3/3) when moist; massive; soft, friable, nonsticky and nonplastic; common very fine roots; many fine interstitial pores and common fine tubular pores; 50 percent angular gravel mostly ½ inch to 2 inches in diameter and 5 percent cobblestones; slightly acid; gradual wavy boundary.

Cr—60 to 70 inches; weathered granitic bedrock.

The A1 horizon is dark brown, dark gray, dark grayish brown, brown, dark yellowish brown, and grayish brown. Texture is coarse sandy loam, sandy loam, or fine sandy loam that is up to 30 percent gravel. The B2 horizon is brown, grayish brown, light brownish gray, or strong brown. The B22 horizon contains 0 to 50 percent gravel. Bedrock consists of weathered metamorphic and acid igneous rock at a depth of more than 40 inches.

PdC—Pfeiffer fine sandy loam, 2 to 9 percent slopes. This is a gently sloping to moderately sloping soil at the base of hills. It has a profile similar to the one described as representative of the series, but the surface layer is fine sandy loam and the subsoil is sandy loam or fine sandy loam. This soil typically lacks coarse fragments.

Included with this soil in mapping were areas of San Andreas soils making up 20 percent of the acreage, areas of Santa Ynez or Gazos soils making up 15 percent, and small areas of soils that have a surface layer of dark gray or dark grayish brown fine sandy loam more than 20 inches thick. Included on the Hunter Liggett Military Reservation were some soils that have a thin, light brownish gray or pale brown surface layer.

Runoff is slow and medium, and the erosion hazard is slight. Roots can penetrate to a depth of 40 to 60 inches. The available water capacity is 5 to 7.5 inches.

This soil is used for range or pasture. Capability unit IIIe-1(15); Coarse Loamy range site.

PdD—Pfeiffer fine sandy loam, 9 to 15 percent slopes. This is a strongly sloping soil on hills and uplands. It has a profile similar to the one described as representative of the series, but the surface layer is fine sandy loam and the subsoil is sandy loam or fine sandy loam. This soil typically lacks coarse fragments.

Included with this soil in mapping were areas of San Andreas soils making up about 25 percent of the acreage, areas of Santa Ynez or Gazos soils making up 15 percent, and small areas of soils that have a surface layer of dark grayish brown or dark gray sandy loam more than 20 inches thick.

Runoff is medium, and the erosion hazard is moderate. Roots can penetrate to a depth of 40 to 48 inches. The available water capacity is 5 or 6 inches.

This soil is used mostly for range, pasture, wildlife habitat, and recreation. A few areas are used for dryland grain, and some areas in the northern part of the county are used for building sites. Capability unit IVe-1(15); Coarse Loamy range site.

Pe—Pfeiffer-Rock outcrop complex. This mapping unit is on mountains. The Pfeiffer soil formed in material that was derived from igneous and metamorphic rocks. It has the profile described as representative of the series. Slopes are 50 to 85 percent. Rock outcrop consists of acid igneous and metamorphic rocks, boulders, and large stones of dolomite and limestone. The soil and rock outcrop were so intermingled that it was not feasible to map them separately at the scale used.

Pfeiffer soils make up about 35 percent of this complex and rock outcrop 25 percent. Areas of Cieneba, Sheridan, Junipero, and Sur soils make up 20 percent. The rest is soils that have more than 35 percent rock fragments larger than one-eighth inch; similar soils that have a surface layer of heavy sandy loam or sandy clay loam that is gravelly in places and a subsoil of reddish brown sandy clay loam; some eroded and gullied areas; and some areas that are less than 10 inches deep to bedrock.

On the Pfeiffer soil, runoff is very rapid, and the erosion hazard is very high. Roots can penetrate to a depth of more than 40 inches. The available water capacity is 4 to 6 inches. On the Rock outcrop, runoff is very rapid, but the erosion hazard is slight.

This complex is used mostly for watershed, wildlife habitat, and recreation. A few small areas are used for grazing. Most areas are inaccessible and can be reached only by foot trail or on horseback. Capability unit VIIIs-1(15); range site not assigned.

Pico Series

The Pico series consists of well drained soils that formed on flood plains in alluvium derived from sedimentary rocks. Slopes are 0 to 2 percent. The vegetation is mainly annual grasses and a few scattered coast live oaks. The elevation is commonly 50 to 100 feet, but ranges to 1,700 feet in some narrow valleys. The mean annual precipitation is 10 to 14 inches, the mean annual air temperature is about 58° F, and the frost-free season is about 235 days. Summers are warm and dry, except in the northern Salinas Valley where they are foggy, and winters are cool and moist.

In a representative profile, the surface layer is grayish brown, mildly alkaline and moderately alkaline fine sandy loam about 18 inches thick. The underlying material is light brownish gray and pale brown, strongly calcareous stratified fine sandy loam, silty clay loam, sandy loam, very fine sandy loam, and sand that extends to a depth of 72 inches or more.

Permeability is moderately rapid, and the available water capacity is 7.5 to 9 inches. Roots penetrate to a depth of more than 60 inches.

Pico soils are used for irrigated crops in the Salinas Valley. Other small areas are used mostly for range.

Representative profile of Pico fine sandy loam, south of Gonzales; 1,200 feet SE on field road along the Southern Pacific Railroad tracks from intersection of Lanini Road, then 450 feet SW into field, about 25 feet from field road.

Ap—0 to 8 inches; grayish brown (2.5YR 5/2) fine sandy loam, very dark grayish brown (2.5Y 3/2) when

moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; very few very fine roots; few very fine tubular pores and common very fine interstitial pores; mildly alkaline; clear wavy boundary.

A12—8 to 18 inches; grayish brown (2.5Y 5/2) fine sandy loam, very dark grayish brown (2.5Y 3/2) when moist; massive; slightly hard; friable, nonsticky and nonplastic; very few very fine roots; few very fine interstitial pores; slightly effervescent with disseminated lime; moderately alkaline; abrupt wavy boundary.

C1ca—18 to 40 inches; light brownish gray (2.5Y 6/2) fine sandy loam, grayish brown (2.5Y 5/2) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine interstitial and tubular pores; strongly effervescent with lime disseminated and in soft masses; moderately alkaline; clear wavy boundary.

IIC2ca—40 to 45 inches; light brownish gray (2.5Y 6/2) silty clay loam, grayish brown (2.5Y 5/2) when moist; massive; hard, friable, sticky and plastic; many very fine tubular pores; violently effervescent with lime in soft masses; moderately alkaline; clear wavy boundary.

IIIC3—45 to 55 inches; light brownish gray (2.5Y 6/2) sandy loam, light olive brown (2.5Y 5/4) when moist; massive; soft, very friable, nonsticky and nonplastic; few very fine interstitial pores; strongly effervescent with disseminated lime; moderately alkaline; clear smooth boundary.

IVC4—55 to 72 inches; pale brown (10YR 6/3) stratified very fine sandy loam, silty clay loam, and sand, olive brown and light olive brown (2.5Y 4/4 and 5/4) when moist; massive; violently effervescent with disseminated lime; moderately alkaline.

The A horizon is dark grayish brown, grayish brown, or brown. Texture commonly is fine sandy loam, but ranges to sandy loam, silt loam, or loam. Free lime commonly is at a depth of 8 inches, but in some areas the Ap horizon may be slightly calcareous.

The C horizon is light brownish gray, pale brown, or very pale brown. Texture is erratically stratified. The horizon with the greatest accumulation of lime occurs at a depth of 12 to 45 inches.

Pf—Pico fine sandy loam. This is a nearly level soil on flood plains. It has the profile described as representative of the series.

Included with this soil in mapping were areas of Metz soils making up about 15 percent of the acreage. Small areas of Mocho, Salinas, Pacheco, and Tujunga soils also were included.

Runoff is slow, and the erosion hazard is slight. If left exposed during periods of high winds, the soil is subject to some soil blowing.

This soil is used mostly for row crops, especially asparagus, lettuce, carrots, and potatoes. Some areas are used for dryland grain and pasture. Capability units I(14), IIIc-1(15); range site not assigned.

Pinnacles Series

The Pinnacles series consists of well drained soils on dissected terraces. These soils formed in material underlain by consolidated gravelly rhyolitic tuff. Slopes are 5 to 75 percent. The vegetation consists of annual grasses, forbs, brush, and a few scattered scrub oaks. The elevation is 1,000 to 2,000 feet. The mean annual precipitation is 10 to 16 inches, the mean annual air temperature is about 62° F, and the frost-free season is about 230 days. Summers are hot and dry, and winters are cool and moist.

In a representative profile the surface layer is light brownish gray, medium acid and slightly acid coarse sandy loam and gravelly sandy loam about 10 inches thick. The subsurface layer is pinkish gray, very strongly acid gravelly sandy loam about 7 inches thick. The subsoil is pinkish gray, very strongly acid gravelly heavy clay loam and gravelly clay about 13 inches thick. Hard consolidated gravelly rhyolitic tuff is at a depth of 30 inches.

Permeability is slow.

Pinnacles soils are used mostly for range and some dryland grain.

Representative profile of Pinnacles coarse sandy loam, 5 to 30 percent slopes, about 8 miles east of Soledad on the road to the Pinnacles National Monument, NW of North Chalone Peak. The site is 1,900 feet east of the main road near the center of the north boundary of sec. 16, or 375 feet SW at the corner of sec. 16, T. 17 S., R. 7 E.

Ap1—0 to 4 inches; light brownish gray (10YR 6/2) coarse sandy loam, dark brown (7.5YR 3/2) when moist; strong medium coarse and very coarse crumb structure; slightly hard, very friable, nonsticky and nonplastic; common very fine roots; many very fine interstitial pores and common fine tubular pores; slightly acid; clear wavy boundary.

Ap2—4 to 10 inches; light brownish gray (10YR 6/2) gravelly light sandy loam, dark brown (7.5YR 3/2) when moist; weak coarse angular blocky structure; hard, very friable, nonsticky and nonplastic; common very fine roots; many very fine interstitial pores and few fine and medium tubular pores; 20 percent gravel and 10 percent cobblestones; medium acid; clear wavy boundary.

A2—10 to 17 inches; pinkish gray (7.5YR 7/2) gravelly heavy sandy loam, brown (7.5YR 4/4) when moist; massive; hard, friable, sticky and slightly plastic; common very fine roots; many very fine interstitial pores and few fine and medium tubular pores; 25 percent gravel and 10 percent cobblestones; very strongly acid; clear wavy boundary.

B21t—17 to 23 inches; pinkish gray (5YR 7/2) gravelly heavy clay loam, dark brown (7.5YR 4/2) when moist; massive; hard, friable, sticky and plastic; few very fine roots; common very fine interstitial pores and common very fine and few fine tubular pores; common thin and moderately thick clay films lining pores and bridging grains; 20 percent gravel and 10 percent cobblestones; very strongly acid; gradual wavy boundary.

B22t—23 to 30 inches; pinkish gray (7.5YR 7/2) gravelly clay, dark grayish brown (10YR 4/2) when moist; massive; hard, firm, sticky and plastic; no roots observed; few very fine tubular pores; many thin and moderately thick clay films lining pores, many thick clay films bridging grains; 25 percent gravel and 10 percent cobblestones; very strongly acid; clear irregular boundary.

C—30 to 36 inches; cemented rhyolite and metasedimentary cobblestones and stones of the Temblor Formation; massive; extremely hard; extremely acid.

The A horizon is light gray, pinkish gray, light brownish gray, grayish brown, or brown when dry and ranges from dark brown to very dark grayish brown and very dark brown when moist. Texture is gravelly sandy loam, coarse sandy loam, or sandy loam. Gravel content ranges from 5 to 35 percent. The gravel commonly is angular and is less than 10 millimeters (½ inch) in diameter, but ranges to 50 millimeters (2 inches). About 5 to 25 percent angular and subrounded cobblestones also occur in this horizon. The content of coarse fragments is similar for the entire profile. Reaction ranges from medium acid to neutral. The A2 horizon is light brownish gray or pinkish gray. Reaction ranges from very strongly acid to medium acid.

The B2t horizon ranges from yellowish brown or pale brown to pinkish gray, and moist values are typically 4 or

5. Texture is clay, light clay, sandy clay, or heavy clay loam. The boundary between the A2 and B2t horizons is abrupt or clear. The B2t horizon is massive when moist or wet and has moderate or strong coarse and very coarse angular blocky structure when dry. Reaction ranges from strongly acid to medium acid. Depth to the B2t horizon ranges from 5 to 20 inches. A B3t horizon occurs in some places.

The C horizon is typically pink or pinkish white. Reaction ranges from extremely acid to strongly acid.

PgE—Pinnacles coarse sandy loam, 5 to 30 percent slopes. This is a moderately sloping to moderately steep soil on dissected and plateaulike terraces. It has the profile described as representative of the series. Typically, slopes are 20 to 30 percent on the dissected terraces and 8 to 15 percent on the plateaulike terraces.

Included with this soil in mapping were small areas of Vista, McCoy, and Gilroy soils; Rock outcrop-Xerorthents association; and Pinnacles soils that have slopes of 30 to 75 percent. Also included were areas where the subsoil is light clay loam or sandy clay loam or is lacking; areas of a soil that is similar to this Pinnacles soil, but has more than 35 percent coarse fragments throughout the profile; and areas of a soil that has a grayish brown surface layer and is mildly alkaline. The last-mentioned soil is calcareous in some places near Topo Canyon south of the Pinnacles. Areas of Shedd, Linne, and San Timoteo soils were also included in the Topo Canyon area.

Runoff is rapid, and the erosion hazard is high. Roots can generally penetrate to a depth of more than 60 inches, but some roots are restricted to a depth of 16 to 20 inches by the clay subsoil. The available water capacity is 2 or 3 inches.

This soil is used mostly for range. A few small areas are used for dryland grain. Some areas have been cleared of brush and are planted to lana vetch. Capability unit VIe–1(15); Claypan range site.

PhG2—Pinnacles stony sandy loam, 30 to 75 percent slopes, eroded. This is a steep and very steep soil on terrace escarpments and hills. It has a profile similar to the one described as representative of the series, but the surface layer is 5 to 15 inches thick. Some ridges have 25 to 30 percent cobblestones on the surface and in the profile or about 0.1 percent stones on the surface.

Included with this soil in mapping were areas of McCoy soils making up about 20 percent of the acreage, Gilroy soils making up 15 percent, Vista soils making up 10 percent, and rock outcrops making up 5 percent. Also included were a few small ridgetops where slopes are less than 30 percent and some areas where the entire surface layer and most of the subsoil is eroded. Areas that are underlain by granite make up about 30 to 40 percent of this mapping unit.

Runoff is very rapid, and the erosion hazard is very high. Roots can generally penetrate to a depth of more than 60 inches, but some roots are restricted to a depth of 5 to 15 inches by the clay subsoil. The available water capacity is 1 or 2 inches.

A few areas of this soil are used for range. Capability unit VIIe–1(15); Coarse Loamy range site.

Pinnacles Variant

The Pinnacles variant consists of well drained soils that formed on dissected terraces in alluvium derived from acid igneous and sedimentary rocks. Slopes are 5 to 50 percent. The vegetation consists of brush, annual grasses, and scattered oaks. The elevation is 900 to 1,900 feet. The mean annual precipitation is 12 to 16 inches, the mean annual air temperature is about 60° F, and the frost-free season is about 210 days. Summers are hot and dry, and winters are cool and moist.

In a representative profile the surface layer is pale brown, slightly acid and medium acid coarse sandy loam about 17 inches thick. The subsurface layer is very pale brown, strongly acid gravelly coarse sandy loam 7 inches thick. The subsoil is pale brown, very strongly acid gravelly clay 8 inches thick. The substratum, at a depth of 32 inches, is yellow, very strongly acid very gravelly sandy clay loam that extends to a depth of more than 60 inches.

Permeability is very slow.

Pinnacles variant soils are used mainly for range. A few areas are used for dryland grain and pasture.

Representative profile of Pinnacles coarse sandy loam, very gravelly subsoil variant, 5 to 30 percent slopes, about 2 miles NE of Jolon; about 1.5 miles east on Lockwood-Jolon Road from intersection with King City-Jolon Road; about 1.4 miles north on dirt road; 0.1 mile south of Reservation Boundary in the center of NW¼SW¼ sec. 30, T. 22 S., R. 8 E.

A11—0 to 11 inches; pale brown (10YR 6/3) coarse sandy loam, brown (10YR 4/3) when moist; moderate medium and coarse subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common very fine roots; few very fine tubular pores and many very fine and fine interstitial pores; 10 percent gravel; slightly acid; gradual wavy boundary.

A12—11 to 17 inches; pale brown (10YR 6/3) coarse sandy loam, brown (10YR 4/3) when moist; weak medium and coarse subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few very fine roots; few very fine and fine tubular pores and many very fine and fine interstitial pores; 10 percent gravel; medium acid; gradual wavy boundary.

A2—17 to 24 inches; very pale brown (10YR 7/3) gravelly coarse sandy loam, brown (10YR 5/3) when moist; weak medium and coarse subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; very few very fine roots; few very fine and fine tubular pores and many very fine and fine interstitial pores; 20 percent gravel; strongly acid; abrupt wavy boundary.

B2t—24 to 32 inches; pale brown (10YR 6/3) gravelly clay, brown (10YR 4/3) when moist; massive; very hard, firm, very sticky and very plastic; very few very fine roots; common very fine and fine tubular pores; continuous thin and common moderately thick clay films lining pores and bridging grains; ¼- to 1-inch very pale brown (10YR 8/3) cappings of A2 horizon; 40 percent gravel; very strongly acid; abrupt wavy boundary.

C—32 to 60 inches; yellow (10YR 7/6) very gravelly sandy clay loam, yellowish brown (10YR 5/6) when moist; massive; hard, friable, sticky and plastic; few very fine tubular and interstitial pores; common moderately thick and thick clay films lining pores and bridging grains; 60 percent gravel; very strongly acid.

The A1 horizon is light brownish gray, pale brown, pinkish gray, brown, or grayish brown. Texture typically is coarse sandy loam, but it is gravelly sandy loam or loam in places. Gravel content ranges from 5 to 20 percent. The A2 horizon is light gray or very pale brown, and texture is gravelly sandy loam or coarse sandy loam. Reaction is strongly acid or medium acid. The A2 horizon is discontinuous or may be as thick as 7 inches.

The B2t horizon is very pale brown, pale brown, or light yellowish brown, and texture is gravelly sandy clay, gravelly clay, or very gravelly clay. Gravel content ranges from 35 to 60 percent. Reaction is very strongly acid or strongly acid.

The C horizon is very pale brown, light yellowish brown, yellow, or pale brown, and texture is gravelly sandy clay loam or very gravelly sandy clay loam. Gravel content ranges from 45 to 75 percent. Reaction is very strongly acid to strongly acid.

PkE—Pinnacles coarse sandy loam, very gravelly subsoil variant, 5 to 30 percent slopes. This is a gently rolling to hilly soil on dissected terraces. It has the profile described as representative of the Pinnacles variant. Slopes are mostly about 6 percent.

Included with this soil in mapping were small areas of Chamise, Placentia, Pinnacles, and Lockwood soils. Also included were areas that have less than 35 percent gravel in the subsoil, a few small areas that are moderately eroded, and areas of soils that are similar to this Pinnacles soil, but have a grayish brown and very dark grayish brown surface layer. Gullied areas were included where this soil is cultivated.

Runoff is medium to rapid, and the erosion hazard is moderate or high. Roots can generally penetrate to a depth of 60 inches or more, but some roots are restricted to a depth of 18 to 25 inches. The available water capacity is 2 to 2.5 inches.

This soil is used mostly for range. A few areas are used for dryland grain. Capability unit VIe-1(15); Claypan range site.

PkF—Pinnacles coarse sandy loam, very gravelly subsoil variant, 30 to 50 percent slopes. This is a steep soil on dissected terraces. It has a profile similar to the one described as representative of the variant, but the surface layer is only 12 to 18 inches thick because of sheet and rill erosion. A few gullies also occur. Slopes are 35 to 40 percent.

Included with this soil in mapping were areas of Chamise soils and Xerorthents, dissected, making up 10 percent of the acreage. Also included were areas of soils that are similar to this Pinnacles soil, but have a grayish brown and dark grayish brown surface layer.

Runoff is rapid, and the erosion hazard is high. Roots can generally penetrate to a depth of more than 60 inches, but some roots are restricted to a depth of 12 to 18 inches. The available water capacity is 1 or 2 inches.

This soil is used for range and wildlife habitat. Capability unit VIIe-1(15); Claypan range site.

Pits and Dumps

Pm—Pits and dumps. This land type consists of areas from which soil and underlying material have been removed and areas of uneven accumulation of waste material. These areas are rock quarries, sand and gravel pits, and excavations for refuse disposal and for fill material. The largest area is the dolomite quarry north of Salinas. Another area is the sand and gravel pit northeast of Greenfield near Metz Station. Drainage channels cut across some areas. Some sites are subject to seasonal flooding and ponding. The elevation is 100 to 1,500 feet. The vegetation is mainly sparse annual grasses and forbs.

Included in mapping were small areas of Rock outcrop-Xerorthents association, Badland, and Psamments and Fluvents.

Drainage, permeability, surface runoff, depth of the root zone, and available water capacity are all variable. The erosion hazard is high.

This land type has no value for farming. Capability unit VIIIe-1(15); range site not assigned.

Placentia Series

The Placentia series consists of well drained soils that formed in alluvium that was derived from granitic and schistose rocks on old alluvial fans and terraces. Slopes are 0 to 30 percent. The vegetation consists of annual grasses and forbs. The elevation is commonly about 50 to 1,400 feet, but ranges to 2,500 feet in Priest Valley. The mean annual precipitation is 12 to 20 inches, the mean annual air temperature is 57° to 60° F, and the frost-free season is generally about 250 days, but is about 150 days in Priest Valley. Summers are warm and dry, except in the northern Salinas Valley where they are often foggy, and winters are cool and moist.

In a representative profile the surface layer and subsurface layer are brown, medium acid sandy loam about 13 inches thick. The subsoil is 45 inches thick. It is dark reddish brown clay, reddish brown clay loam, and strong brown sandy clay loam and is moderately alkaline throughout. The substratum, at a depth of about 58 inches, is strong brown, moderately alkaline gravelly sandy loam that extends to a depth of more than 68 inches.

Permeability is very slow.

Placentia soils are used for grain, grain-hay pasture, and for irrigated field crops.

Representative profile of Placentia sandy loam, 2 to 9 percent slopes, 0.72 mile NW on Iverson Road from Johnson Canyon Road, 0.47 mile NE to the reservoir, 300 feet SW, 24 feet NW.

Ap1—0 to 5 inches; brown (7.5YR 5/4) sandy loam, dark brown (7.5YR 3/2) when moist; massive, compacted by tillage; hard, very friable, slightly sticky and slightly plastic; common very fine and few fine roots; many very fine interstitial pores and few very fine and medium tubular pores; medium acid; clear smooth boundary.

Ap2—5 to 12½ inches; brown (7.5YR 5/4) sandy loam, dark brown (7.5YR 3/2) when moist; weak medium subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; many very fine roots; many very fine interstitial pores and common very fine and fine tubular pores; medium acid; many gopher holes filled with granular soil material that contains many more roots than matrix; abrupt smooth boundary.

A2—12½ to 13 inches; brown (10YR 5/3) sandy loam, dark brown (7.5YR 4/4) when moist; weak medium platy structure; hard, very friable, slightly sticky and slightly plastic; many very fine interstitial pores and few very fine tubular pores; medium acid; abrupt smooth boundary.

B21t—13 to 20 inches; dark reddish brown (5YR 3/4, moist or dry) clay; moderate coarse prismatic structure, prisms slightly rounded at the top; extremely hard, very firm, very sticky and plastic; common very fine exped roots; few very fine interstitial and tubular pores; continuous moderately thick clay films on faces of peds; moderately alkaline; gradual smooth boundary.

B22t—20 to 29 inches; dark reddish brown (5YR 3/3) clay,

dark brown (7.5YR 3/4) when moist; strong coarse angular blocky structure; extremely hard, very firm, very sticky and very plastic; common very fine exped roots; few very fine interstitial and tubular pores; continuous clay films bridging grains, continuous moderately thick clay films on faces of peds; few black stains on faces of peds; moderately alkaline; clear wavy boundary.

B23tca—29 to 36 inches; reddish brown (5YR 4/4, moist or dry) clay loam; moderate medium angular blocky structure; very hard, firm, sticky and plastic; few very fine exped roots; common very fine interstitial and tubular pores; many thin clay films bridging grains, continuous thin clay films on peds; strongly effervescent with lime segregated in medium-sized lime seams; moderately alkaline; gradual smooth boundary.

B24t—36 to 42 inches; strong brown (7.5YR 5/6) heavy sandy clay loam, dark reddish brown (5YR 3/4) when moist; moderate medium angular blocky structure; very hard, firm, sticky and plastic; few very fine roots; many very fine interstitial pores; many thin clay films bridging grains, continuous thin clay films on faces of peds; few lime seams trailing down from above horizon; moderately alkaline; clear smooth boundary.

B3t—42 to 58 inches; strong brown (7.5YR 5/6) light sandy clay loam, brown (7.5YR 4/4) when moist; massive; very hard, friable, sticky and plastic; very few very fine roots; many very fine interstitial pores and few very fine and medium tubular pores; common thin clay films bridging grains; horizon is weakly cemented; moderately alkaline; gradual smooth boundary.

C—58 to 68 inches; strong brown (7.5YR 5/6) gravelly sandy loam, brown (7.5YR 4/4) when moist; massive; hard, very friable, slightly sticky and slightly plastic; no roots observed; many very fine interstitial pores and few fine tubular pores; common very thin clay films bridging grains; 20 percent gravel; moderately alkaline.

The Ap or A1 horizon ranges from dark grayish brown and grayish brown to yellowish brown when dry and is dark grayish brown or dark brown when moist. Texture commonly is sandy loam, but ranges to light clay loam and is gravelly in places. Reaction ranges from medium acid to mildly alkaline. Thickness of the Ap or A1 horizon is 10 to 36 inches. The A2 horizon is discontinuous, but where present is brown to pinkish gray. Reaction is slightly acid or medium acid. This horizon is up to 4 inches thick.

The B2t horizon ranges from dark reddish brown to yellowish brown. Texture is clay, gravelly clay, gravelly sandy clay, sandy clay, and sandy clay loam; in many places it becomes coarser with increasing depth. Reaction ranges from neutral to moderately alkaline. Although this horizon is typically effervescent in the lower part, it has no lime in some places. Some places have more than 15 percent exchangeable sodium. The B3 or B3t horizon is brown or strong brown, and texture is sandy clay loam or clay loam that is gravelly in places. Reaction ranges from neutral to moderately alkaline.

The C horizon ranges from dark grayish brown to strong brown, and texture ranges from coarse sandy loam to light sandy clay loam that is gravelly in places. Reaction ranges from neutral to moderately alkaline.

PnA—Placentia sandy loam, 0 to 2 percent slopes. This soil is on old alluvial fans and terraces. It has a profile similar to the one described as representative of the series, but it has a grayish brown surface layer that is about 24 inches thick and ranges to 36 inches thick.

Included with this soil in mapping were small areas of Danville, Gloria, and Chualar soils and Placentia soils that have some slopes of more than 2 percent. Also included were some areas that have an overwash of dark brown clay loam 8 to 12 inches thick and a few small depressions that pond during intensive storms. Included north of Salinas to the county line near U.S. Highway 101 were some areas of soils that have a surface layer of sandy loam or loam underlain by dark grayish brown clay at a depth of 16 to 36 inches.

Runoff is slow, and the erosion hazard is slight. Roots can generally penetrate to a depth of more than 60 inches, but some roots are restricted to a depth of 20 to 36 inches. The available water capacity is 3.5 to 7 inches; a limited amount of moisture is available from the clay subsoil.

This soil is used mainly for irrigated row and field crops. Some areas are used for irrigated pasture or hay. Capability unit IIIs-3 (14) ; Claypan range site.

PnC—Placentia sandy loam, 2 to 9 percent slopes. This is a gently sloping and moderately sloping soil on old alluvial fans and terraces. It has the profile described as representative of the series. Slopes are mostly 4 to 6 percent.

Included with this soil in mapping were small areas of Gloria, Antioch, Chualar, Danville, and Pinnacles soils and small areas of Placentia soils that have slopes of more than 9 percent and less than 2 percent. Included in Indian Valley and Vineyard Canyon were small areas of Rincon and Cropley soils; small areas that have granitic cobbles on the surface; and small areas that have a surface layer of dark gray clay loam, a slightly acid subsoil, and a substratum of calcareous sandy loam that has siliceous shale and granitic rock fragments. Some soils included in mapping have more than 35 percent coarse fragments in the subsoil. On the Hunter Liggett Military Reservation, mostly in the valleys along the San Antonio River and in Stony Valley, small areas of Santa Ynez, Lockwood, and Chamise soils and Cropley soils in swales were also included.

Runoff is slow or medium, and the erosion hazard is slight or moderate. Roots can generally penetrate to a depth of more than 60 inches, but some roots are restricted to a depth of 12 to 26 inches. The available water capacity is 2 to 5 inches; some water is slowly available from the clay subsoil.

This soil is used mainly for grain, grain-hay, and pasture. Some areas are used for irrigated row and field crops and some strawberries. Capability units IVe-3 (14), IVe-3 (15) ; Claypan range site.

PnD—Placentia sandy loam, 9 to 15 percent slopes. This is a strongly sloping soil on terraces. It has a profile similar to the one described as representative of the series, but the surface layer is 10 to 20 inches thick. Slopes are mostly about 11 percent.

Included with this soil in mapping were small areas of Gloria and McCoy soils and small areas of Placentia soils that have slopes of less than 9 percent and more than 15 percent. Included in Vineyard Canyon and Indian Valley were small areas of Rincon, Chualar, Linne, and Nacimiento soils and soils that have rounded gravel and cobbles in the surface layer and have a medium acid subsoil. Soils that have a surface layer of dark brown sandy loam and a subsoil of light reddish brown and brown clay underlain by granitic bedrock were included on foot slopes near Natividad.

Runoff is medium, and the erosion hazard is moderate. Roots can generally penetrate to a depth of more than 60 inches, but some roots are restricted to a depth of 10 to 20 inches. The available water capacity is 2 to 4 inches; some water is slowly available from the clay subsoil.

This soil is used for annual pasture, grain, and some hay. Some small areas are irrigated. Capability units IVe–3 (14), IVe–3 (15); Claypan range site.

PnE—Placentia sandy loam, 15 to 30 percent slopes. This is a moderately steep soil on terraces. It has a profile similar to the one described as representative of the series, but the surface layer is 10 to 20 inches thick. Slopes are mostly 20 to 25 percent.

Included with this soil in mapping were small areas of Gloria, Chamise, and Pinnacles soils; Placentia soils that have slopes of less than 15 percent; and soils that have rounded granitic cobbles in the surface layer. Included in Vineyard Canyon and Indian Valley were small areas of Chualar, Rincon, Nacimiento, and Diablo soils and soils that have a surface layer of dark gray fine gravelly heavy loam and sandy clay loam and a substratum of very pale brown to yellowish brown. Small areas of Santa Ynez and Arnold soils were included in the northern part of Monterey County. Small, severely eroded areas that have some gullies were also included.

Runoff is rapid, and the erosion hazard is high. Roots can generally penetrate to a depth of more than 60 inches, but some roots are restricted to a depth of 10 to 20 inches. The available water capacity is 2 to 4 inches.

This soil is used mostly for range. Capability unit VIe–1 (15); Claypan range site.

PoE—Placentia-Arbuckle complex, 15 to 30 percent slopes. This complex consists of moderately steep soils on high terraces. They formed in mixed alluvium. These soils were so intermingled that it was not feasible to map them separately at the scale used.

Placentia soils make up about 45 percent of this complex and Arbuckle soils 30 percent. Placentia soils generally have a southern exposure, and Arbuckle soils have a northern exposure. The rest of the complex is made up of areas of Lockwood, Los Osos, Pinnacles, Rincon, and Santa Lucia soils; Xerorthents, dissected; a light brownish gray gravelly coarse sandy loam; and a soil that has a surface layer of gravelly coarse sandy loam and a subsoil of acid clay.

Roots can generally penetrate the Placentia soil to a depth of more than 60 inches, but some roots are restricted to a depth of 12 to 26 inches. The available water capacity is 2 to 5 inches; some water is slowly available from the clay subsoil.

Runoff is medium and rapid. The erosion hazard is moderate on the Arbuckle soil and high on the Placentia soil.

This complex is used mainly for range, watershed, and wildlife habitat. Capability unit VIe–1 (15); Placentia soil in Claypan range site, Arbuckle soil in Loamy range site.

Plaskett Series

The Plaskett series consists of excessively drained soils on hills and mountains. These soils formed in material underlain by fractured sandstone, shale, and schist. Slopes are 30 to 75 percent. The vegetation consists of mixed hardwoods, brush, bracken, grasses, and scattered pines. The elevation is 600 to 3,500 feet. The mean annual precipitation is 25 to 70 inches, the mean annual air temperature is 54° to 57° F, and the frost-free season is 200 to 300 days. Summers are warm and dry, and winters are cool and moist.

In a representative profile the surface layer is 10 inches thick. It is dark grayish brown, medium acid gravelly loam and dark brown, slightly acid very shaly loam. It is underlain by fractured, hard, fine grained sandstone.

Permeability is moderately rapid, and the available water capacity is 1 to 2 inches. Roots penetrate to a depth of 10 to 20 inches.

Plaskett soils are used for watershed, wildlife habitat, and a site for military maneuvers.

Representative profile of Plaskett gravelly loam, in an area of McMullin-Plaskett complex, about 100 feet north of Burma Road opposite the junction with the jeep trail to Los Burros Creek (Hunter Liggett Military Reservation); about ¼ mile east and 100 feet north of SW corner of sec. 20, T. 23 S., R, 6 E.

O1—1 inch to 0; litter of oak leaves and twigs in various stages of decomposition; medium acid; abrupt wavy boundary.

A11—0 to 3 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) when moist; weak medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine interstitial pores; 30 percent angular shale fragments; medium acid; clear wavy boundary.

A12—3 to 10 inches; dark brown (10YR 4/3) very shaly loam, dark brown (10YR 3/3) when moist; weak medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine and common medium roots; many very fine interstitial pores; 75 percent shale fragments; slightly acid; clear wavy boundary.

IIR—10 to 24 inches; pale brown (10YR 6/3), fractured, hard, fine grained sandstone, brown (10YR 4/3) when moist; some roots extend into the fractured rock for several feet; slightly acid.

The A horizon is 6 to 20 inches thick. The A1 horizon is dark grayish brown, grayish brown, dark brown, or brown; moist hue commonly is 7.5YR or 10YR. It is loam, fine sandy loam, or sandy loam and, in places, it has 5 to 25 percent gravel or stones in the upper part. The lower part is more than 35 percent rock fragments and ranges to 70 or 80 percent. Rock outcrops occur in some areas. Reaction ranges from medium acid to neutral. In places there is a C horizon or, less commonly, a B2 horizon. Depth to bedrock ranges from 10 to 20 inches. The bedrock is fractured sandstone, shale, or schist.

Pp—Plaskett-Reliz complex. This mapping unit consists of steep and very steep soils on mountains, mostly in the Los Padres National Forest and on the Hunter Liggett Military Reservation. These soils are so intermingled that it was not feasible to map them separately at the scale used. Slopes are 30 to 75 percent.

Plaskett soils make up about 35 percent of this complex and Reliz soils 30 percent. Plaskett soils typically are along drainageways in areas that have a western exposure, and Reliz soils are on ridgetops in areas that have a southern exposure. The rest of the complex consists of McMullin, Sur, Henneke, Lopez, and Los Gatos soils which make up about 20 percent of the acreage; rock outcrops which make up 10 percent; and soils that are similar to Plaskett soils, but have slopes of more than 75 percent or are severely eroded, which make up 5 percent.

Runoff is very rapid, and the erosion hazard is very high.

This complex is used mostly for range, woodland, watershed, recreation, and wildlife habitat. Trees are mostly noncommercial varieties such as interior live

oak, madrone, and laurel. These species commonly are scrubs. There are a few scattered Coulter pine, knobcone pine, and digger pine.

The Plaskett soil has low productivity for Coulter pine (site index averages about 50). The seedling mortality and windthrow hazard are moderate. The equipment limitation is severe. Reliz soils are not used for woodland. Capability unit VIIe–1(15); Plaskett soil not assigned a range site, Reliz soil in Shallow Loamy range site.

Psamments and Fluvents

Pr—Psamments and Fluvents, occasionally flooded. This mapping unit consists of undulating areas of stratified sandy, gravelly, and cobbly sediments on flood plains. These areas are subject to flooding, scouring, and deposition every 3 to 5 years. Typical areas are along the San Antonio, Nacimiento, Salinas, and Arroyo Seco Rivers and adjacent to perennial and intermittent streams. The elevation ranges from 20 to 2,000 feet. The vegetation is mostly scattered sagebrush, some willow and sycamore trees, and a sparse cover of annual grass and forbs.

Small areas of Aquic Xerofluvents and Metz, Tujunga, and Mocho soils were included in mapping.

Drainage is excessive, and permeability is very rapid. Runoff is slow or very slow, and the erosion hazard is moderate. Roots can penetrate to a depth of 60 inches, and the available water capacity is 2 to 3 inches.

This land has very little value for farming. It is used for recreation and for very limited range. Capability unit VIw–1(15); Sandy range site.

Ps—Psamments and Fluvents, frequently flooded. This mapping unit consists of undulating areas of stratified sandy, gravelly, and cobbly sediments on flood plains. These areas are subject to annual flooding, scouring, and deposition. Typical areas are along the San Antonio, Nacimiento, Salinas, and Arroyo Seco Rivers and adjacent to perennial and intermittent streams. The elevation ranges from 20 to 2,000 feet. The vegetation is mostly scattered sagebrush, some willows and sycamores, and a sparse cover of annual grasses and forbs.

Small areas of Aquic Xerofluvents and Metz, Tujunga, and Mocho soils were included in mapping.

Drainage is excessive, and permeability is very rapid. Runoff is slow or very slow, and the erosion hazard is moderate. Roots can penetrate to a depth of 60 inches, and the available water capacity is 2 to 3 inches.

This land has very little value for farming. It is used for recreation and for very limited range. Capability unit VIIIw–1(15); Sandy range site.

Reliz Series

The Reliz series consists of excessively drained soils on uplands. These soils formed in material underlain by shale and sandstone. Slopes are 30 to 75 percent. The vegetation consists of annual grasses, forbs, scrub oaks, chamise, and manzanita. The elevation is 500 to 3,400 feet. The mean annual precipitation is 10 to 55 inches, the mean annual air temperature is 58° to 62° F, and the frost-free season is 200 to 250 days. Summers are hot and dry, and winters are cool and moist.

In a representative profile the surface layer is light gray, slightly acid shaly clay loam 12 inches thick. It is underlain by fractured hard shale.

Permeability is moderate, and the available water capacity is 1 to 2 inches. Roots penetrate to a depth of 10 to 20 inches.

Reliz soils are used for range, watershed, and wildlife habitat.

Representative profile of Reliz shaly clay loam, in an area of Santa Lucia-Reliz association, south of Greenfield, 1 mile up Reliz Canyon Road from Herbert Ranch; in SE¼SE¼ sec. 35, T. 19 S., R. 6 E.

A11—0 to 5 inches; light gray (10YR 7/2) shaly clay loam, brown (10YR 4/3) when moist; moderate fine and medium granular structure; slightly hard, friable, sticky and plastic; common very fine and few fine roots; many very fine tubular pores and few fine interstitial pores; 35 percent ¼- to 1-inch shale fragments; slightly acid; clear wavy boundary.

A12—5 to 12 inches; light gray (10YR 7/2) very shaly clay loam, brown (10YR 4/3) when moist; massive; slightly hard, friable, sticky and plastic; common very fine and few very fine roots; many very fine tubular pores and few very fine interstitial pores; 20 percent ¼- to 1-inch shale fragments and 30 percent 2- to 6-inch shale fragments; slightly acid; clear wavy boundary.

R—12 to 20 inches; hard, fractured siliceous shale of the Monterey Formation.

The A1 horizon is grayish brown, brownish gray, pale brown, light gray, very pale brown, and light brownish gray and is typically shaly clay loam, but ranges to very shaly clay loam and shaly loam. The content of shale fragments ranges from 25 percent in the upper part of the A1 horizon to 70 percent in the lower part. Reaction is strongly acid to neutral. Depth to hard shale ranges from 10 to 20 inches. Most of the shale is siliceous and occurs in the Monterey Formation. Where the soil has formed over sandstone and nonsiliceous shale, the lower part of the A1 horizon is yellowish brown, light yellowish brown, very pale brown, or brown, and reaction ranges to very strongly acid.

Reliz soils occur only with Plaskett or Santa Lucia soils.

Rincon Series

The Rincon series consists of well drained soils that formed in alluvium derived from sandstone and shale on alluvial fans and terraces. Slopes are 0 to 30 percent. The vegetation consists of annual grasses and forbs. The elevation is mostly 100 to 2,000 feet. Except in the Priest Valley area, the mean annual precipitation is 12 to 20 inches, the mean annual air temperature is 57° to 59° F, and the frost-free season is about 250 days. In the Priest Valley area, the elevation is about 2,500 feet, the annual precipitation is 20 inches, and the frost-free season is about 150 days.

In a representative profile the surface layer is dark grayish brown, slightly acid clay loam about 14 inches thick. The subsoil is dark grayish brown, brown, and light yellowish brown, neutral to moderately alkaline clay and heavy clay loam 35 inches thick. The substratum is pale yellow, moderately alkaline, calcareous clay loam that extends to a depth of more than 60 inches.

Permeability is slow.

Rincon soils are used mostly for irrigated field and

row crops. Some areas are used for dryland grain and pasture.

Representative profile of Rincon clay loam, 0 to 2 percent slopes, about 2 miles north of San Lucas; about 1.2 miles north on Freeman Flat Road from State Highway 198; 500 feet west into field along fence from Freeman Flat Road; in sec. 29, T. 20 S., R. 9 E.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) clay loam, very dark gray and very dark grayish brown (10YR 3/1 and 3/2) when moist; massive; hard, friable, sticky and plastic; common very fine roots; common very fine tubular pores; slightly acid; clear smooth boundary.

A12—7 to 14 inches; dark grayish brown (10YR 4/2) clay loam; very dark grayish brown (10YR 3/2) when moist; massive; hard, friable, sticky and plastic; common very fine roots; common very fine tubular pores; slightly acid; gradual smooth boundary.

B1t—14 to 19 inches; dark grayish brown (10YR 4/2) heavy clay loam, very dark grayish brown (10YR 3/2) when moist; massive; hard, firm, sticky and plastic; few very fine roots; common very fine tubular pores; few thin clay films bridging mineral grains; neutral; gradual smooth boundary.

B21t—19 to 31 inches; brown (10YR 5/3) clay, dark brown (10YR 4/3) when moist; weak coarse prismatic structure; very hard, firm, very sticky and very plastic; few very fine roots; common very fine tubular pores; common thin clay films on faces of peds and lining pores; mildly alkaline; clear wavy boundary.

B22t—31 to 40 inches; light yellowish brown (10YR 6/4) clay, yellowish brown (10YR 5/4) when moist; moderate coarse prismatic structure; very hard, very firm, very sticky and very plastic; no roots observed; common very fine tubular pores; many moderately thick clay films on faces of peds and lining pores; mildly alkaline; clear wavy boundary.

B3t—40 to 49 inches; light yellowish brown (10YR 6/4) heavy clay loam, yellowish brown (10YR 5/4) when moist; weak medium subangular blocky structure; hard, friable, sticky and plastic; common very fine tubular pores; few thin clay films on faces of peds and lining pores; very slightly effervescent; lime segregated in a few soft masses; moderately alkaline; clear wavy boundary.

Cca—49 to 60 inches; pale yellow (2.5Y 7/4) clay loam, light olive brown (2.5Y 5/4) when moist; massive; hard, friable, sticky and plastic; few very fine tubular pores; strongly effervescent, lime segregated in seams and soft masses; moderately alkaline.

The A horizon is dark gray, gray, dark grayish brown, or grayish brown. Texture typically is clay loam, but ranges to heavy loam, silty clay loam, sandy clay loam, or light clay. Reaction typically is slightly acid, but ranges from strongly acid to mildly alkaline. The wide range in reaction results from cultivation. The Ap horizon or upper part of the A horizon typically has hard or very hard clods if cultivated.

The Bt horizon ranges from dark gray and dark grayish brown in the upper part to brown, light yellowish brown, yellowish brown, or pale brown in the lower part. Texture is clay or heavy clay loam. The Bt horizon ranges from neutral to moderately alkaline and is calcareous in the lower part. The boundary between the A horizon and B2t horizon is clear or gradual, or there is a transitional A3 horizon, B1 horizon, or B1t horizon. There is generally a B3 horizon, B3t horizon, or B3tca horizon.

The C horizon is pale yellow, very pale brown, light gray, light grayish brown, light yellowish brown, or yellowish brown. Texture ranges from clay loam to loam and is stratified in places. In some areas the C horizon is fine sand, loamy sand, or weathered sandstone. These materials are at a depth of more than 40 inches.

RaA—Rincon clay loam, 0 to 2 percent slopes. This is a nearly level soil on alluvial fans and terraces. It has the profile described as representative of the series. The surface layer is clay loam, heavy loam, or light clay.

Included with this soil in mapping were small areas of Cropley, Docas, Antioch, Salinas, Garey, Greenfield, Sorrento, and Lockwood soils and some areas of Rincon soils that have slopes of 2 to 5 percent. Included in Freeman Flat north of San Lucas were areas of soils that have a surface layer of fine sandy loam and a subsoil of clay. Some fine sandy loam material was deposited as a result of runoff from adjacent Garey and Oceano soils.

Runoff is slow, and the erosion hazard is minimal. Roots can penetrate to a depth of more than 60 inches. The available water capacity is 9 to 11 inches.

This soil is used mostly for irrigated field and row crops. A few areas are used for dryland grain. Capability unit IIs–3 (14); range site not assigned.

RaC—Rincon clay loam, 2 to 9 percent slopes. This is a gently sloping and moderately sloping soil on alluvial fans and terraces. The surface layer is typically clay loam, but ranges to silty clay loam or sandy clay loam. Slopes are mostly 3 to 5 percent.

Included with this soil in mapping were areas of Rincon clay loam, 0 to 2 percent slopes.

Runoff is slow, and the erosion hazard is slight. Roots can penetrate to a depth of more than 60 inches. The available water capacity is 9 to 11 inches.

This soil is used mostly for irrigated field and row crops. Some areas are used for dryland grain. Capability unit IIe–3 (14); range site not assigned.

RaD—Rincon clay loam, 9 to 15 percent slopes. This is a rolling soil on terraces. The surface layer is typically clay loam but ranges to sandy clay loam or loam. Slopes are mostly 10 percent.

Included with this soil in mapping were small areas of Snelling, Alo, Diablo, Shedd, Los Osos, Chamise, Linne, and Nacimiento soils. Also included were areas of soil on terrace crests that are severely eroded and where the subsoil or calcareous substratum is exposed; some soils on tops of dissected terraces that have slopes of 2 to 9 percent; and a few areas on side slopes where slopes are 15 to 25 percent.

Runoff is medium, and the erosion hazard is moderate. The available water capacity is 9 to 11 inches. Roots can penetrate to a depth of more than 60 inches.

This soil is used mostly for dryland grain. Capability unit IIIe–3 (14); range site not assigned.

RaE—Rincon clay loam, 15 to 30 percent slopes. This is a hilly soil on dissected terraces. The surface layer is typically clay loam but ranges to silty clay loam, sandy clay loam, or loam. In some places the substratum is fine sand or loamy fine sand below a depth of 40 inches and is cemented or is weathered sandstone. Slopes are mostly 20 to 25 percent.

Included with this soil in mapping were small areas of Snelling, Alo, Los Osos, and Chamise soils. Areas of severely eroded soils on terrace crests where the subsoil or substratum is exposed make up about 10 percent of this mapping unit.

Runoff is rapid, and the erosion hazard is moderate. Roots can penetrate to a depth of 40 to 60 inches. The available water capacity is 6 to 11 inches.

This soil is used mostly for dryland grain. Capability unit IVe-3 (14) ; range site not assigned.

Rindge Series

The Rindge series consists of very poorly drained organic soils that formed in reed and tule residue and mixed mineral alluvium in freshwater marshes, sloughs, and drainage channels. Slopes are less than 2 percent. The vegetation consists of water-tolerant plants. Most areas are in permanent pasture or are cultivated. The elevation is commonly 2 to 3 feet, but ranges to 40 feet in some lake basins. The mean annual precipitation is 14 to 20 inches, the mean annual air temperature is 57° to 59° F, and the frost-free season is 250 to 300 days. Summers are mainly warm and dry but are foggy at times, and winters are cool and moist.

In a representative profile the soil is black, mildly alkaline to strongly acid, highly decomposed organic layers to a depth of 60 inches or more.

Permeability is rapid. The water table is generally at a depth of 10 and 30 inches, and the available water capacity is 6 to 10 inches. When drained, the available water capacity is 15 to 18 inches. Roots can penetrate to a depth of more than 60 inches.

Rindge soils are used mostly for permanent pasture or for wildlife habitat and recreation.

Representative profile of Rindge muck, about 3 miles south of Watsonville, 0.25 mile south on Blohm Road from Hall Road, 600 feet west of Blohm Road, and 200 feet north of a fence line.

Oa1—0 to 1 inch; black (10YR 2/1) sapric material (10YR 2/1) rubbed, very dark gray (10YR 3/1) when dry; less than 35 percent fibers; strong medium and fine granular structure; slightly hard and soft, friable, nonsticky and nonplastic; many very fine and fine roots; mildly alkaline; abrupt smooth boundary.

Oa2—1 to 9 inches; black (N2/0) broken and rubbed sapric material, very dark gray (N3/0) when dry; less than 35 percent fibers; strong medium and fine granular structure and strong medium and coarse angular blocky structure; very hard, friable, nonsticky and nonplastic; many very fine and fine roots; reed and tule fibers; mildly alkaline; abrupt smooth boundary.

Oa3—9 to 21 inches; black (10YR 2/1) broken and rubbed sapric material, moist and dry; less than 35 percent fibers; massive; very hard, friable, nonsticky and nonplastic; many very fine roots; tule and reed fibers; strongly acid; clear smooth boundary.

Oa4—21 to 30 inches; black (10YR 2/1) broken and rubbed sapric material, few dark yellowish brown fibers (10YR 3/4) rubbed, very dark gray and black (10YR 3/1, 2/1) when dry; 40 to 55 percent fibers, 6 to 9 percent rubbed; massive; slightly hard, friable, nonsticky and nonplastic; common very fine roots; mostly herbaceous reed and tule fibers; 5 to 10 percent charcoal and woody fragments; slightly acid; clear smooth boundary.

Oa5—30 to 60 inches; black (10YR 2/1) sapric material broken and rubbed, moist and dry, few dark yellowish brown fibers (10YR 3/4) rubbed; less than 35 percent fibers; massive; very hard, friable, nonsticky and nonplastic; few very fine roots; reed and tule fibers; 10 to 15 percent woody and charcoal fragments; medium acid.

The upper 51 inches of soil material (control section) has thin layers of loam, silt loam, clay loam, or only partly decomposed organic material, but combined they are less than 10 inches thick. Organic matter in the control section ranges from 25 to 50 percent. The content of fibers averages less than 35 percent before rubbing and is less than 10 percent after rubbing.

The Oa1, Oa2, and Oa3 layers are sapric. They have about 35 percent organic matter and about 5 to 20 percent fibers before rubbing that are barely observable after rubbing. These layers are black or very dark gray. Reaction ranges from moderately alkaline to strongly acid.

The Oa4 layer is generally sapric, but ranges to hemic. It has about 30 to 65 percent organic matter, 30 to 55 percent fibers before rubbing, and less than 9 percent fibers after rubbing. It is black, very dark grayish brown, or dark brown when moist and rubbed. Reaction ranges from slightly acid to strongly acid.

The Oa5 layer is sapric and has about 25 to 40 percent organic matter. It is black or very dark gray when moist and rubbed. Reaction ranges from slightly acid to medium acid.

Rb—Rindge muck. This is a nearly level soil in old sloughs, tidal basins, old lake basins, and drainageways. Slopes are less than 1 percent.

Included with this soil in mapping were areas of Alviso soils making up about 10 to 15 percent of the acreage, areas of Clear Lake soils making up 10 percent, and small areas of Aquic Xerofluvents and wet marshy basins, sloughs, or lakes. Also included were some areas that have mineral soils of sandy loam to clay at a depth of 30 to 40 inches.

Runoff is very slow, or water ponds on the surface. There is no erosion hazard. In some places the water table has been lowered by artificial drainage using open ditches, tidal gates, or some pumping. If this soil dries out, it is very difficult to rewet.

This soil is used mostly for pasture, recreation, or wildlife habitat. Capability unit VIw-1 (15) ; range site not assigned.

Rock Outcrop-Xerorthents Association

Rc—Rock outcrop-Xerorthents association. This mapping unit consists of Rock outcrop and very shallow soils on strongly sloping to extremely steep mountains. The elevation ranges from sea level to 5,800 feet. The annual precipitation ranges from about 15 to 80 inches or more. Some snowfall occurs on the high mountain ridges, and in some years it remains on the ground for 1 or 2 months.

There are about 4 major kinds of rock outcrop. One kind consists of fine to very coarse sandstone, shale, and conglomerate. It is near McMullin, Gaviota, Reliz, Plaskett, Santa Lucia, Millsholm, and Lopez soils.

Another kind of rock outcrop consists of granodiorite, granite, gabbro, greenstone, serpentine, and limestone. It is near Cieneba, Sur, Junipero, Sheridan, Henneke, Gilroy, Plaskett, and Vista soils.

Some rock outcrop is fractured shale that has no vegetative cover except a few scattered knobcone or Coulter pines. It is near Gaviota and Millsholm soils. In some places the surface layer is covered with boulders and stones. Rock outcrop makes up 25 to 90 percent of the association. The rest consists of very shallow soils. In a few places, typically the area east of the Coast Ridge Road, west of the Nacimiento River, and between Burma and McKern Roads on the Hunter Liggett Military Reservation, up to 70 percent of the association consists of soils deeper than 10 inches. The vegetation consists mostly of sparse annual grasses and forbs, brush, hardwoods, and pines. Some areas

have Santa Lucia fir, coast redwood, or Monterey cypress.

The fourth kind of rock outcrop ranges widely from hard gneiss and schist to weathered sandstone, shale, and serpentine. It is near the McCoy variant and Millsholm, Pfeiffer, Cieneba, Gazos, Sur, Los Gatos, and Gamboa soils, and the serpentine is near Climara, Montara, and Henneke soils. It commonly occurs on steep to extremely steep mountains that slope directly to canyon bottoms or to the ocean, mostly along the coast from Carmel Highland south to the county line. The content of gravel, cobblestones, and stones ranges from 5 to 90 percent. The amount of silt and debris varies considerably. Some areas are mostly hard rock with little soil or vegetation. Other areas are almost entirely barren and are large landslides, land slumps, colluvium, and rubble. In these areas, large amounts of silt and debris are produced that at times block State Highway 1 for extended periods. The landslides are typically in areas of serpentine. The vegetation consists of annual grasses and forbs, coastal chaparral, yucca, pampasgrass, and some perennial bunchgrass. Included in mapping along the coast were some small areas of nearly level to strongly sloping soils on benches or ridges and some coastal beaches. The major soils on the benches are Lockwood and Santa Ynez soils.

Runoff is generally rapid on this land type, and the erosion hazard is very high where the soil is exposed. Drainage, permeability, effective rooting depth, and available water capacity are extremely variable within short distances. Some roots penetrate the rock where it is fractured or weathered.

This association has no value for farming. It is used mostly for watershed or wildlife habitat. Some areas are used for recreation and for their scenic value. Capability unit VIIIs-1(15); range site not assigned.

Salinas Series

The Salinas series consists of well drained soils that formed in mixed alluvium derived from sedimentary and granitic rocks on alluvial fans and river terraces. Slopes are 0 to 9 percent. The native vegetation was annual grasses and forbs, but most areas are now cultivated. The elevation is commonly 50 to 500 feet, but ranges to 2,000 feet in the inland mountain valleys. The mean annual precipitation is 10 to 15 inches, the mean annual air temperature is 57° to 60° F, and the frost-free season is about 250 days. Summers are warm and dry, except in the northern Salinas Valley where they are foggy, and winters are cool and moist.

In a representative profile the surface layer is about 33 inches thick. It is very dark gray and dark gray, moderately alkaline clay loam and silty clay loam and moderately alkaline silt loam. The underlying material is grayish brown and light brownish gray, calcareous very fine sandy loam and fine sandy loam that extends to a depth of more than 60 inches.

Permeability is moderately slow, and roots penetrate to a depth of more than 60 inches.

Salinas soils are used for irrigated field and row crops in the Salinas Valley. Other areas are used for dryland grain or pasture.

Representative profile of Salinas clay loam, 0 to 2 percent slopes, about 1.3 miles south of the Chualar Underpass on U.S. Highway 101, about 1,100 feet SW on a paved road crossing the Southern Pacific Railroad, then 600 feet SE on a farm road, about 30 feet NE into the field.

Ap1—0 to 5 inches; very dark gray (10YR 3/1) clay loam, black (10YR 2/1, rubbed) when moist; weak coarse subangular blocky structure; very hard, firm, very sticky and plastic; few very fine roots; many very fine interstitial pores and common very fine and few fine tubular pores; moderately alkaline; clear smooth boundary.

Ap2—5 to 13 inches; very dark gray (10YR 3/1, moist or dry) silty clay loam; weak coarse subangular blocky structure; very hard, firm, very sticky and plastic; common very fine roots; common very fine interstitial pores and few medium and fine tubular pores; moderately alkaline; clear smooth boundary.

A13—13 to 23 inches; very dark gray (10YR 3/1, moist or dry) silty clay loam; moderate medium subangular blocky structure; very hard, firm, sticky and plastic; few very fine roots; common very fine interstitial pores and common very fine and few fine tubular pores; some dark grayish brown (10YR 4/2) when moist lumps and mottles that increase with increasing depth; moderately alkaline; gradual wavy boundary.

A14—23 to 33 inches; dark gray (10YR 4/1) silt loam, very dark grayish brown (10YR 3/2) when moist; weak medium subangular blocky structure; hard, friable, sticky and plastic; very few very fine roots; many very fine interstitial pores and common very fine and few fine tubular pores; this horizon and all following horizons have 10 to 15 percent krotovinas of darker A horizon material; moderately alkaline; diffuse smooth boundary.

C1—33 to 40 inches; grayish brown (2.5Y 5/2) very fine sandy loam, very dark grayish brown (10YR 3/2) when moist; massive; slightly hard, friable, slightly sticky and slightly plastic; many very fine interstitial pores and few medium and fine and common very fine tubular pores; slightly effervescent with disseminated lime; about 5 percent root channels filled with darker A horizon material; moderately alkaline; gradual smooth boundary.

C2—40 to 49 inches; grayish brown (2.5Y 5/2) fine sandy loam, olive brown (2.5Y 4/3) when moist; massive; soft, very firm, nonsticky and nonplastic; many very fine interstitial pores and few very fine and fine tubular pores; slightly effervescent with disseminated lime, strongly effervescent where lime is in a few fine masses; moderately alkaline; gradual smooth boundary.

C3—49 to 75 inches; light brownish gray (2.5Y 6/2) fine sandy loam, light olive brown (2.5Y 5/3) when moist; massive; soft, friable, slightly sticky and slightly plastic; many very fine interstitial pores; strongly effervescent with disseminated lime; moderately alkaline.

The A horizon commonly ranges from dark gray and very dark gray or gray to grayish brown in the lower part of the A horizon. Texture is clay loam, silty clay loam, silt loam, loam, or fine sandy loam. Reaction ranges from neutral to moderately alkaline. The horizon is typically noncalcareous to a depth of about 20 inches.

The C horizon is grayish brown, light brownish gray, or light yellowish brown, and texture is silty clay loam, silt loam, clay loam, fine sandy loam, very fine sandy loam, or loam.

SaA—Salinas loam, 0 to 2 percent slopes. This soil is on river terraces. It has a profile similar to the one described as representative of the series, but the surface layer is loam, silt loam, or fine sandy loam.

Included with this soil in mapping were small areas of Pico, Mocho, and Cropley soils and Salinas clay

loam, 0 to 2 percent slopes. Some soils that are very similar to Salinas soils, but are slightly acid or neutral throughout were also included.

Runoff is slow, and the erosion hazard is slight. The available water capacity is 10 to 12 inches.

This soil is used mostly for irrigated row and field crops in the Salinas Valley. Capability unit I(14); range site not assigned.

SbA—Salinas clay loam, 0 to 2 percent slopes. This soil is on low terraces. It has the profile described as representative of the series. The surface layer is clay loam, silty clay loam, heavy loam, or heavy silt loam.

Included with this soil in mapping were areas of Mocho soils making up 20 percent of the acreage and small areas of Cropley, Clear Lake, Sorrento, and Pacheco soils. Also included, south of Salinas and east of Spreckels for about 2 miles, were areas where the surface layer contains varying amounts of lime received from the sugar factory in waste water used for irrigation. Some areas have a surface layer that is stratified with coarser textured or finer textured soil material. Also included were some soils that are very similar to Salinas soils, but are slightly acid or neutral throughout.

Runoff is slow, and the erosion hazard is minimal. The available water capacity is 11 to 13 inches.

This soil is used mostly for irrigated row and field crops in the Salinas Valley. Capability unit I(14); range site not assigned.

SbC—Salinas clay loam, 2 to 9 percent slopes. This is an undulating to gently rolling soil on river terraces and fans. The surface layer is typically clay loam, but ranges to heavy loam, silty clay loam, and sandy clay loam. Slopes are mostly 4 percent.

Included with this soil in mapping were small areas of Mocho, Cropley, Rincon, and Sorrento soils.

Runoff is medium, and the erosion hazard is slight. The available water capacity is 11 to 13 inches.

This soil is used for irrigated field and row crops in the Salinas Valley. Other areas are used for dryland grain or pasture. Capability units IIe-1(14), IIIe-1(15); range site not assigned.

San Andreas Series

The San Andreas series consists of well drained soils on hills. These soils formed in material underlain by weathered sandstone. Slopes are 15 to 75 percent. The vegetation consists of oaks, brush, grasses, and scattered digger pine. The elevation is 300 to 2,500 feet. The mean annual precipitation is 16 to 35 inches, the mean annual air temperature is 57° to 62° F, and the frost-free season is about 240 days. Summers are hot and dry, and winters are cool and moist.

In a representative profile the surface layer is grayish brown, slightly acid fine sandy loam 14 inches thick. The subsoil is light brownish gray, pale brown, and light gray, slightly acid fine sandy loam 8 inches thick. Light gray and light brownish gray weathered sandstone is at a depth of 22 inches.

Permeability is moderately rapid.

San Andreas soils are used for native range. Some are used for wildlife habitat, military training grounds, and watershed.

Representative profile of San Andreas fine sandy loam, 30 to 75 percent slopes, 1 mile from Corral de Tierra along Underwood Road, about 55 feet west of road cut and about 100 feet SW of a large white oak; in SE¼SE¼ sec. 19, T. 16 S., R. 3 E.

A1—0 to 14 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) when moist; massive except moderate fine granular structure in upper 1 inch; slightly hard, very friable, nonsticky and nonplastic; many very fine roots in upper 1 inch, common very fine, fine, and medium roots below; many very fine interstitial pores and many very fine and common fine tubular pores; 2 to 5 percent coarse quartz sand; slightly acid; abrupt wavy boundary.

B21—14 to 19 inches; mixed light brownish gray (10YR 6/2) and pale brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) and dark grayish brown (2.5Y 4/2) when moist; weak coarse subangular blocky structure; hard, very friable, nonsticky and nonplastic; common very fine roots; many very fine interstitial pores and common very fine, fine, and medium tubular pores; very dark grayish brown (10YR 3/2, moist) material in 2 to 5 percent of horizon; slightly acid; clear wavy boundary.

B22—19 to 22 inches; mixed light gray (10YR 7/2) and light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) when moist; massive; very hard, very friable, nonsticky and nonplastic; few very fine roots; many very fine interstitial pores and common very fine and few fine tubular pores; few thin clay films bridging sand grains, coating sand grains, and lining pores, clay films concentrated in streaks rather than randomly scattered in the horizon; slightly acid; clear wavy boundary.

Cr—22 to 48 inches; light gray (10YR 7/2) and light brownish gray (10YR 6/2) weathered sandstone; crushes to heavy loamy fine sand; few very fine roots in fractures; common thin clay films in fractures in the upper part; slightly acid; augered with only slight difficulty when slightly moist.

The A1 horizon ranges from grayish brown to dark gray and, in the Jolon area, to brown. Texture is sandy loam, fine sandy loam, and very fine sandy loam. The A1 horizon has granular or subangular blocky structure or is massive. Reaction is slightly acid or neutral. Thickness of this horizon ranges from 8 to 20 inches.

The B horizon ranges from grayish brown to light gray and to light yellowish brown. Texture is similar to or somewhat finer than the A1 horizon. The content of clay films ranges from none to common, and the films are thin and darker than the soil mass. When dry, the soil material of the B horizon is slightly hard, hard, or very hard. Reaction is slightly acid or neutral.

The C horizon ranges from strongly acid to mildly alkaline. The stone content ranges from a few scattered stones to about 2 percent. Depth to weathered bedrock ranges from 20 to 40 inches. The sandstone may be easily chipped by hand tools but cannot be penetrated by roots except along joints.

ScE—San Andreas fine sandy loam, 15 to 30 percent slopes. This is a moderately steep soil on lower hillsides. It has a profile similar to the one described as representative of the series, but depth to weathered sandstone is 30 to 40 inches.

Included with this soil in mapping were areas of San Andreas fine sandy loam, 30 to 75 percent slopes, and areas of Gaviota and Arnold soils. Also included, at elevations above 3,000 feet in the Los Padres National Forest, were small areas of San Andreas soils that have a mean annual soil temperature of less than 59° F.

Runoff is rapid, and the erosion hazard is moderate. Roots can penetrate to a depth of 30 to 40 inches. The available water capacity is 3.5 to 6.5 inches.

This soil is used for range, wildlife habitat, water-

shed, or recreation. Capability unit VIe–1(15); Coarse Loamy range site.

ScG—San Andreas fine sandy loam, 30 to 75 percent slopes. This is a steep and very steep soil on low hills. It has the profile described as representative of the series. Depth to sandstone is 20 to 40 inches.

Included in mapping were areas of soils making up about 40 percent of the acreage. These included areas of Santa Ynez soils on lower hills and side slopes and areas of Arnold and Gaviota soils commonly near the tops of hills. Soils that are similar to San Andreas soils, but are less than 20 inches deep to bedrock, commonly make up about 20 percent but range to 50 percent of the mapped areas. Also included, and making up about 10 percent of the acreage, were soils that have a subsoil of light clay loam; small areas of Gazos and Pfeiffer soils; similar sandy loam soils that have no subsoil; and some areas of Sheridan soils near the coast. Some very strongly acid or strongly acid soils were also included.

Runoff is rapid or very rapid, and the erosion hazard is high. Roots can penetrate to a depth of 20 to 40 inches. The available water capacity is 2 to 6.5 inches.

This soil is used for range. Capability unit VIIe–1(15); Coarse Loamy range site.

San Benito Series

The San Benito series consists of well drained soils on uplands. These soils formed in material underlain by calcareous sandstone and shale. Slopes are 30 to 75 percent. The vegetation consists of annual grasses and forbs, scattered oaks, and some shrubs. The elevation is 1,000 to 3,500 feet. The mean annual precipitation is 12 to 25 inches, the mean annual air temperature is about 58° F, and the frost-free season is about 250 days. Summers are hot and dry, and winters are cool and moist.

In a representative profile the surface layer is grayish brown, neutral clay loam about 15 inches thick and grayish brown, moderately alkaline, calcareous clay loam 21 inches thick. It is underlain by brown, moderately alkaline, calcareous silt loam 19 inches thick. Weathered calcareous shale is at a depth of 55 inches.

Permeability is moderately slow, and the available water capacity is 7 to 12 inches. Roots penetrate to a depth of 40 to 60 inches.

San Benito soils are used for range.

Representative profile of San Benito clay loam, 50 to 75 percent slopes, about 9 miles east of King City, about 6 miles up Sweetwater Canyon, 190 yards south from the junction where Sweetwater Canyon forks to the north in the center of NW¼SE¼SW¼ sec. 1, T. 20 S., R. 9 E.

A11—0 to 15 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) when moist; strong coarse subangular blocky structure; slightly hard, firm, sticky and plastic; many very fine and fine, common medium, and few coarse roots; many very fine and fine, common medium, and few coarse tubular pores; neutral; clear wavy boundary.

A12ca—15 to 36 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) when moist; weak medium subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine, fine, and medium and few coarse roots; common very fine and fine tubular pores; strongly effervescent with lime in soft seams; moderately alkaline; clear wavy boundary.

C1ca—36 to 55 inches; brown (10YR 5/3) heavy silt loam, dark brown (10YR 4/3) with areas of grayish brown (10YR 5/2) and very dark grayish brown (10YR 3/2) when moist; weak medium subangular blocky structure; slightly hard, friable, sticky and plastic; few very fine, fine, and coarse and common medium roots; common very fine and fine tubular pores; strongly effervescent with lime in soft seams; moderately alkaline; abrupt irregular boundary.

C2r—55 to 60 inches; weathered calcareous shale.

The A1 horizon is dark gray, dark grayish brown, dark brown, grayish brown, and brown. Texture typically is clay loam, but ranges to silty clay loam, heavy silt loam, or heavy loam in places. The horizon is 30 to 45 inches thick. It is slightly to strongly effervescent and has lime below a depth of 12 inches.

The C1ca horizon is gray, grayish brown, brown, or pale brown, and texture is heavy silt loam, loam, or clay loam. In some places there is a slight increase in clay from the A horizon to the C horizon. Depth to calcareous shale or sandstone ranges from 40 to 60 inches.

SdF—San Benito clay loam, 30 to 50 percent slopes. This is a steep soil on uplands that have a northern exposure. Slopes are mostly more than 40 percent.

Included with this soil in mapping were areas of Diablo soils making up about 15 percent of the acreage, areas of Alo soils making up 10 percent, and small areas of Linne, Nacimiento, Gazos, and Los Osos soils. Also included, and making up about 15 percent of the acreage, was a soil that is very similar to this San Benito soil, but only 30 to 40 inches deep to bedrock. This soil has the potential to develop small landslips, especially when it is saturated or very wet.

Runoff is rapid, and the erosion hazard is moderate.

This soil is used for range. Capability unit VIe–1(15); Fine Loamy range site.

SdG—San Benito clay loam, 50 to 75 percent slopes. This is a very steep soil on uplands that have a northern exposure. It has the profile described as representative of the series. Slopes are mostly 55 to 65 percent.

Included with this soil in mapping were areas of Alo soils making up about 20 percent of the acreage; areas of Linne, Nacimiento, Diablo, Los Osos, and Shedd soils; and a few areas that have a gravelly surface layer. Also included, and making up about 15 to 20 percent of the acreage, was a soil that is very similar to this San Benito soil, but only 24 to 40 inches deep to bedrock. This soil has the potential to develop small landslips, especially when it is saturated.

Runoff is very rapid, and the erosion hazard is high.

This soil is used for range. Capability unit VIIe–1(15); Fine Loamy range site.

San Timoteo Series

The San Timoteo series consists of well drained soils on uplands. These soils formed in material underlain by calcareous, coarse, crystalline igneous rock. Slopes are 30 to 75 percent. The vegetation is mostly brush; California sage, black sage, buckwheat, and deerweed; and some scattered annual grasses and forbs. The elevation is 400 to 2,000 feet. The mean annual precipitation is 12 to 15 inches or 8 to 12 inches in some isolated areas, the mean annual air temperature is 60° to 65° F,

and the frost-free season is about 230 days. Summers are hot and dry, and winters are cool and moist.

In a representative profile the surface layer is light brownish gray and pale brown, calcareous gravelly loam about 14 inches thick. Below this is very pale brown, calcareous gravelly heavy loam 10 inches thick. It is underlain by fractured calcareous granite.

Permeability is moderately rapid, and the available water capacity is 2 to 4 inches. Roots penetrate to a depth of 20 to 30 inches.

San Timoteo soils are used for limited grazing.

Representative profile of San Timoteo gravelly loam, 30 to 75 percent slopes, about 5.5 miles east of Soledad; about 3.2 miles from Metz Road on the Pinnacles Road up Shirttail Gulch, then about 50 yards north up the hillside, near the center of NW¼ sec. 29, T. 17 S., R. 7 E.

A11—0 to 7 inches; light brownish gray (10YR 6/2) gravelly loam, dark grayish brown (10YR 4/2) when moist; strong medium and fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine, fine, and medium roots; common very fine and fine and few medium tubular pores; 20 percent 2- to 10-millimeter angular gravel; strongly effervescent with disseminated lime; moderately alkaline; gradual wavy boundary.

A12—7 to 14 inches, pale brown (10YR 6/3) gravelly loam, yellowish brown (10YR 5/4) when moist; moderate medium and fine granular structure; slightly hard, friable, nonsticky and nonplastic; many very fine, fine, and medium roots; common very fine and fine and few medium tubular pores; 20 percent 2- to 10-millimeter angular gravel; strongly effervescent with disseminated lime; moderately alkaline; clear wavy boundary.

AC—14 to 24 inches; very pale brown (10YR 7/3) gravelly heavy loam, yellowish brown (10YR 5/4) when moist; massive; slightly hard, friable, nonsticky and nonplastic; common very fine and fine and few medium roots; few fine tubular pores; 20 to 25 percent 2- to 15-millimeter angular gravel; violently effervescent with disseminated lime; moderately alkaline; gradual wavy boundary.

Cr—24 to 36 inches; fractured calcareous granite.

The A1 horizon is light brownish gray to pale brown or brown, and texture is gravelly loam to gravelly sandy loam that is 15 to 35 percent fine (2 to 10 millimeters) angular gravel. The soil is slightly to violently effervescent and contains disseminated lime. Lime content typically increases with increasing depth. In places there are a few thin discontinuous clay films in the lower part of the A1 horizon and the upper part of the C horizon. Depth to weathered granite ranges from 20 to 30 inches.

SeG—San Timoteo gravelly loam, 30 to 75 percent slopes. This is a steep and very steep soil on uplands. It has the profile described as representative of the series. Slopes are mostly 35 to 55 percent.

Included with this soil in mapping, and each making up about 10 percent of the acreage, were Cieneba soils and granitic rock outcrops. Also included were small areas of Vista, McCoy, Shedd, and Sheridan soils.

Runoff is very rapid, and the erosion hazard is very high.

This San Timoteo soil is used for wildlife habitat and watershed. A few areas are used for range. Capability unit VIIe-1(15); Loamy range site.

Santa Lucia Series

The Santa Lucia series consists of well drained soils on uplands. These soils formed in material underlain by hard shale mostly of the Monterey Formation. Slopes are 28 to 75 percent. The vegetation consists of annual grasses, oats, buckwheat, scrub oaks, a few scattered thickets of brush, and a few coastal oaks. The elevation is 500 to 3,000 feet. The mean annual precipitation is 12 to 25 inches, the mean annual air temperature is about 60° F, and the average frost-free season is 200 to 250 days. Summers are hot and dry, and winters are cool and moist.

In a representative profile the surface layer is 24 inches thick. It is gray, strongly acid shaly clay loam and grayish brown, strongly acid very shaly clay loam. Hard, fractured shale is at a depth of 24 inches.

Permeability is moderate.

Santa Lucia soils are used mostly for range, but small, gently rolling and hilly areas are used for dryland grain.

Representative profile of Santa Lucia shaly clay loam, 30 to 50 percent slopes, 1¼ miles up Reliz Canyon from Arroyo Seco Road, 1,300 feet west in NE¼SE¼ sec. 22, T. 19 S., R. 6 E.

A11—0 to 6 inches; gray (10YR 5/1) shaly clay loam, very dark gray (10YR 3/1) when moist; strong fine and medium granular structure; slightly hard, very friable, sticky and plastic; many very fine and fine and few medium and coarse roots; many very fine and fine and few medium interstitial and tubular pores; 35 percent shale fragments; strongly acid; clear smooth boundary.

A12—6 to 16 inches; gray (10YR 5/1) shaly clay loam, very dark grayish brown (10YR 3/2) when moist; weak medium subangular blocky structure and moderate fine and medium granular structure; slightly hard, very friable, sticky and plastic; common very fine and few fine roots; many very fine and few fine tubular pores; 30 percent shale fragments; strongly acid; clear wavy boundary.

A13—16 to 24 inches; grayish brown (10YR 5/2) very shaly clay loam, very dark grayish brown (10YR 3/2) when moist; strong fine and medium granular structure; slightly hard, very friable, sticky and plastic; many very fine and fine, common medium, and few coarse roots; many very fine and fine and few medium tubular pores; 50 percent shale fragments; strongly acid; abrupt irregular boundary.

R—24 to 30 inches; hard, fractured Monterey shale.

The A1 horizon is dark gray or gray, but in some places it approaches dark grayish brown or grayish brown, especially in the lower part. Texture is clay loam, loam, heavy clay loam, or clay. The content of angular shale fragments ½ to 3 inches in diameter is 30 to 80 percent. Reaction ranges from slightly acid to strongly acid. In places the clay increases just above the bedrock or between rock fractures. Depth to shale ranges from 20 to 40 inches.

SfD—Santa Lucia shaly clay loam, 2 to 15 percent slopes. This is an undulating to rolling soil on ridgetops and foot slopes or in narrow valleys. It has a profile similar to the one described as representative of the series, but depth to shale typically is 20 to 40 inches. Slopes are mostly about 9 percent.

Included with this soil in mapping were areas of Lockwood, Gazos, Chamise, and Nacimiento soils and areas where sheet and rill erosion is moderate, especially areas that are cultivated. In small narrow valleys mainly on the Hunter Liggett Military Reservation, Elder soils were also included.

Runoff is medium, and the erosion hazard is moderate. Roots can penetrate to a depth of 20 to 40 inches. The available water capacity is 2 to 5.5 inches.

This soil is used mostly for dryland grain and range. Capability unit IVe-4(15); Loamy range site.

SfE—Santa Lucia shaly clay loam, 15 to 30 percent slopes. This is a moderately steep soil on uplands. Slopes are mostly about 20 percent.

Included with this soil in mapping were areas of Gazos, Chamise, and Nacimiento soils and small eroded areas.

Runoff is medium, and the erosion hazard is moderate. Roots can penetrate to a depth of 20 to 40 inches. The available water capacity is 2 to 5.5 inches.

This soil is used for range and dryland grain and for homesites or building sites. Capability unit IVe-4(15); Loamy range site.

SfF—Santa Lucia shaly clay loam, 30 to 50 percent slopes. This is a steep soil on uplands. It has the profile described as representative of the series. Slopes are mostly 45 percent.

Included with this soil in mapping were areas of Lopez, Gazos, and Reliz soils making up about 10 to 15 percent of the acreage; small areas of Chamise, Los Osos, and Nacimiento soils; and some Santa Lucia soils that have slopes of less than 30 or more than 50 percent. Also included were soils that have a light brownish gray surface layer and a light yellowish brown subsoil; soils that are very similar to Santa Lucia soils, but less than 20 inches deep to bedrock; soils that are neutral to mildly alkaline or very strongly acid; and some soils on which sheet or rill erosion is moderate.

Runoff is rapid, and the erosion hazard is high. Roots can generally penetrate to a depth of 20 to 40 inches, but some roots extend into the fractured shale. The available water capacity ranges from 2 to 5.5 inches, depending on the amount of shale fragments in the soil.

This soil is used for range. Capability unit VIe-1(15); Loamy range site.

Sg—Santa Lucia-Reliz association. The steep and very steep soils in this association are on uplands. Slopes are 30 to 75 percent.

Santa Lucia soils make up 35 percent of this association and Reliz soils 25 percent. Santa Lucia soils are in areas that have a northern exposure, and Reliz soils are on ridgetops or in areas that have a southern exposure. Lopez soils on ridgetops and on side slopes that have a southern exposure make up 20 percent of the association (fig. 9). The rest consists of areas of Chamise, Gazos, Nacimiento, San Benito, and Los Osos soils and Rock outcrop; some areas that have slopes of less than 30 percent or more than 75 percent; and some areas on ridgetops, mostly south and southwest

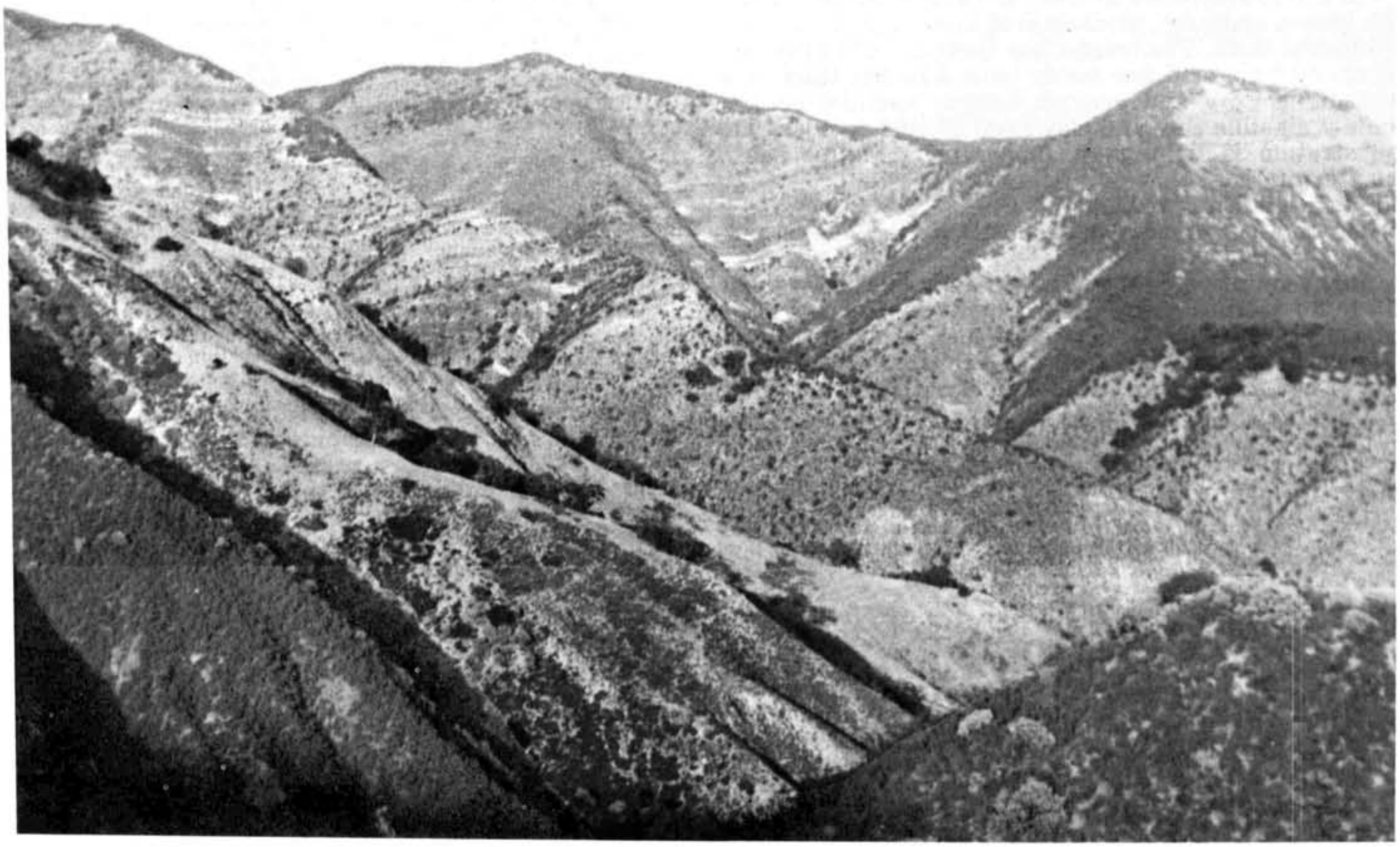

Figure 9.—**An area in the Santa Lucia-Reliz association.**

of the Arroyo Seco, that have a surface layer of pale brown, strongly acid shaly clay loam 3 inches thick and a subsoil of light yellowish brown, very strongly acid shaly clay loam underlain by fractured shale at a depth of about 15 inches. These inclusions are commonly severely eroded.

The Santa Lucia soil has an available water capacity of 2 to 5.5 inches, and roots can penetrate to a depth of 20 to 40 inches. The Reliz soil has the profile described as representative of the Reliz series.

Runoff is rapid or very rapid, and the erosion hazard is very high.

The soils in this association are used for wildlife habitat and watershed. A few areas are used for range. Capability unit VIIe-1(15); Santa Lucia soil in Loamy range site, Reliz soil in Shallow Loamy range site.

Santa Ynez Series

The Santa Ynez series consists of moderately well drained soils that formed on terraces in alluvium derived from sandstone and granitic rock. Slopes are 2 to 30 percent. The vegetation consists of annual grasses, forbs, scattered oaks, and brush. The elevation is 100 to 1,200 feet. The mean annual precipitation is 15 to 25 inches, the mean annual air temperature is 57° to 59° F, and the frost-free season is about 250 days. Summers are mainly warm and dry, but they are often foggy in the northern part of the county, and winters are cool and moist.

In a representative profile the surface layer is grayish brown and gray, medium acid fine sandy loam about 16 inches thick. The subsurface layer is light brownish gray, medium acid fine sandy loam 2 inches thick. The subsoil is gray and grayish brown, medium acid to mildly alkaline clay and clay loam 25 inches thick. The substratum is light gray, moderately alkaline sandy clay loam.

Permeability is very slow.

Santa Ynez soils are used mostly for range and pasture.

Representative profile of Santa Ynez fine sandy loam, 15 to 30 percent slopes, near Corral de Tierra Valley, about 0.5 mile on Underwood Road from Corral de Tierra Road, then 170 feet into field in NW corner of SW¼ sec. 20, T. 16 S., R. 3 E.

A11—0 to 3 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) when moist; moderate coarse subangular blocky structure and moderate fine and medium granular structure; slightly hard, friable, nonsticky and nonplastic; many very fine and fine roots; many very fine interstitial pores and common very fine and few fine tubular pores; medium acid; clear wavy boundary.

A12—3 to 16 inches; gray (10YR 5/1) or grayish brown (10YR 5/2 rubbed) fine sandy loam, very dark grayish brown (10YR 3/2) when moist; weak coarse subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common very fine and medium and few fine roots; common very fine and fine and few medium tubular pores; medium acid; clear wavy boundary.

A2—16 to 18 inches; light brownish gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) when moist; massive; slightly hard, friable, nonsticky and nonplastic; common very fine and fine and many medium roots, mostly horizontal; medium acid; abrupt wavy boundary.

B21t—18 to 26 inches; gray (10YR 5/1 inped) or grayish brown (10YR 5/2 exped) clay, very dark grayish brown (10YR 3/2) when moist; strong coarse columnar structure that parts to strong medium prismatic; very hard, firm, very sticky and very plastic; common very fine and medium and few fine exped roots; few very fine tubular pores; continuous moderately thick clay films on faces of peds and lining pores; medium acid; clear wavy boundary.

B22t—26 to 36 inches; gray (10YR 5/1) heavy clay loam, very dark grayish brown (10YR 3/2) when moist; moderate coarse prismatic structure that parts to strong coarse angular blocky; very hard, firm, sticky and plastic; common very fine and few fine and medium exped roots; few fine tubular pores; continuous thick clay films lining pores; many thin and moderately thick clay films on faces of peds; slightly acid in upper part, neutral in lower part; clear wavy boundary.

B3t—36 to 43 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) when moist; many coarse distinct pale brown (10YR 6/3) mottles; weak coarse subangular blocky structure; very hard, firm, sticky and plastic; few very fine exped roots; few very fine tubular pores; many thin clay films lining pores, common thin clay films bridging mineral grains; mildly alkaline; clear wavy boundary.

C—43 to 61 inches; light gray (2.5Y 7/2) sandy clay loam, grayish brown and light yellowish brown (2.5Y 5/2 and 6/4) when moist; few fine prominent black (10YR 2/1) mottles that appear to be charcoal; massive; slightly hard, friable, slightly sticky and slightly plastic; moderately alkaline.

The profile is up to 15 percent small pebbles 2 to 10 millimeters in diameter.

The A1 horizon is dark gray, gray, dark grayish brown, or grayish brown. Texture commonly is fine sandy loam, but ranges to sandy loam, very fine sandy loam, or loam. The horizon is massive in places. Reaction ranges from medium acid to neutral. The A2 horizon commonly ranges from thin cappings on the B2t horizon to 2 inches thick, but is up to 8 inches thick in some places. It is pale brown, light brownish gray, light gray, or white fine sandy loam or loam.

The B2t horizon is gray, grayish brown, brown, yellowish brown, light olive brown, or light brownish gray. Texture is clay, sandy clay, or heavy clay loam. The B21t horizon typically has columnar or prismatic structure, and the B22t horizon is columnar, prismatic, or angular blocky. Reaction ranges from medium acid to mildly alkaline. Depth to the B2t horizon ranges from 15 to 36 inches.

The C horizon is light brownish gray, pale brown, light gray, very pale brown, or white. Texture is loamy sand, fine sandy loam, or sandy clay loam. Reaction ranges from medium acid to moderately alkaline.

ShC—Santa Ynez fine sandy loam, 2 to 9 percent slopes. This is a gently sloping to moderately sloping soil on terraces. It has a profile similar to the one described as representative of the series, but the surface layer typically is thicker. The surface layer is about 20 to 30 inches thick, but ranges from 16 to 36 inches thick. This soil is neutral to moderately alkaline where cultivated. Slopes are mostly about 5 percent, but north and west of Salinas slopes are typically 2 to 4 percent.

Included with this soil in mapping, and making up about 40 percent of the acreage, was a soil that is very similar to Santa Ynez soil but is underlain by a cemented layer at a depth of 30 to 60 inches. This soil is in the northern part of the Salinas Valley. Also included were some areas where the underlying alluvium is indurated; small areas of Alviso soils near sloughs; Cropley soils in swales and on toe slopes; Elkhorn, San Andreas, Antioch, and Diablo soils on the stronger side slopes; and, in other parts of the county, small

areas of Antioch, Lockwood, Garey, San Andreas, and Los Osos soils. Included in areas throughout the county were some soils that are very similar to Santa Ynez soils, but have neutral to moderately alkaline subsoils.

Runoff is slow or medium, and the erosion hazard is slight or moderate. Roots can generally penetrate to a depth of 60 inches or more, but some roots are restricted to a depth of 15 to 36 inches by the clay subsoil. The available water capacity is 3 to 5 inches, and some water is slowly available from the subsoil.

North of Salinas this soil is used for irrigated row crops, strawberries, and pasture. It is also used for dryland grain and range throughout the area. Capability units IVe-3(14), IVe-3(15); Claypan range site.

ShD—Santa Ynez fine sandy loam, 9 to 15 percent slopes. This is a strongly sloping soil on terraces and low hills. It has a profile similar to the one described as representative of the series, but the surface layer commonly is 16 to 32 inches thick.

Included with this soil in mapping were small areas of Diablo, Elkhorn, Antioch, and Snelling soils. Included in the northern part of the county, and making up about 60 percent of the acreage, were areas of this Santa Ynez soil that are underlain by a cemented layer at a depth of 30 to 60 inches. Also included were some areas of Santa Ynez soils that have 2 to 9 percent slopes, some areas that have 5 to 15 percent slopes and are eroded, and a few small areas that have 15 to 30 percent slopes.

Runoff is medium, and the erosion hazard is moderate. Roots can generally penetrate to a depth of 60 inches or more, but some roots are restricted to a depth of 16 to 32 inches by the clay subsoil. The available water capacity is 2.5 to 4 inches.

This soil is used mostly for range or pasture. Some areas are used for dryland grain. Capability units IVe-3(14), IVe-3(15); Claypan range site.

ShD2—Santa Ynez fine sandy loam, 5 to 15 percent slopes, eroded. This is a gently rolling to rolling soil on low hills and terraces. It has a profile similar to the one described as representative of the series, but is eroded. This soil has many small rills and gullies after winter rains, especially where cultivated. Rill and sheet erosion have removed some of the original surface layer, exposing the subsoil on some hill crests or ridges, and there are some gullies in swales. Depth to the subsoil ranges from 16 to 24 inches.

Included with this soil in mapping were small areas of Antioch, Snelling, Garey, Dibble, and Placentia soils. Also included were small areas of Santa Ynez soils that have 2 to 9 percent slopes, some that have 9 to 15 percent slopes and no erosion, and some that have 15 to 30 percent slopes. Some soils that are underlain by an indurated layer at a depth of 30 to 60 inches and others that have a very strongly acid subsoil were also included.

Runoff is medium, and the erosion hazard is moderate. Roots can generally penetrate to a depth of 60 inches or more, but some roots are restricted to a depth of 16 to 24 inches by the clay subsoil. The available water capacity is 2.5 to 3.5 inches.

This soil is used for dryland grain and range. Capability unit IVe-3(15); Claypan range site.

ShE—Santa Ynez fine sandy loam, 15 to 30 percent slopes. This is a hilly soil on dissected terraces. It has the profile described as representative of the series. Slopes are mostly about 25 percent.

Included with this soil in mapping were areas of San Andreas soils making up about 15 percent of the acreage; areas of a soil that is very similar to Santa Ynez soil, but is underlain by a cemented layer at a depth of 30 to 60 inches, making up about 35 percent; and small areas of Antioch, Snelling, Elkhorn, Arnold, and Haire soils. Also included were some soils that are very similar to Santa Ynez soils, but have a brown, light gray, or light brownish gray surface layer. Some areas of severe gully erosion were also included.

Runoff is rapid, and the erosion hazard is high. Roots can generally penetrate to a depth of 60 inches or more, but some roots are restricted to a depth of 15 to 30 inches by the clay subsoil. The available water capacity is 2.5 to 4 inches.

This soil is used mostly for range. Capability unit VIe-1(15); Claypan range site.

Shedd Series

The Shedd series consists of well drained soils on uplands. These soils formed in material underlain by calcareous shale and sandstone. Slopes are 9 to 75 percent. The vegetation consists of annual grasses, forbs, and brush. The elevation is 300 to 2,000 feet. The mean annual precipitation is 10 to 16 inches, the mean annual air temperature is 58° to 60° F, and the frost-free season is about 250 days. Summers are hot and dry, and winters are cool and moist.

In a representative profile the surface layer is gray, moderately alkaline, calcareous silty clay loam about 23 inches thick. It is underlain by light gray, moderately alkaline, calcareous silty clay loam. Soft calcareous shale is at a depth of 30 inches.

Permeability is moderately slow.

Shedd soils are used for range and dryland grain.

Representative profile of Shedd silty clay loam, 15 to 30 percent slopes, about 9 miles east of King City up Wildhorse Canyon, about 30 feet down from the ridgetop, in the center of SE¼NW¼ sec. 11, T. 20 S., R. 9 E.

A11—0 to 5 inches; gray (5Y 6/1) silty clay loam, dark grayish brown (2.5Y 4/2) when moist; moderate medium angular blocky structure; hard, very friable, sticky and plastic; common very fine roots; common very fine interstitial and tubular pores; strongly effervescent with disseminated lime; moderately alkaline; clear smooth boundary.

A12—5 to 12 inches; gray (5Y 6/1) silty clay loam, very dark grayish brown (2.5Y 3/2) when moist; strong medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; many very fine interstitial pores and common very fine, fine, and medium tubular pores; strongly effervescent with disseminated lime; moderately alkaline; gradual smooth boundary.

A13—12 to 23 inches; gray (5Y 6/1) silty clay loam, very dark grayish brown (2.5Y 3/2) when moist; strong medium subangular blocky structure; slightly hard, very friable, sticky and plastic; few very fine roots; many very fine interstitial pores and common very fine, fine, and medium tubular pores; violently effervescent with disseminated lime; moderately alkaline; abrupt wavy boundary.

C1ca—23 to 30 inches; light gray (2.5Y 7/2) silty clay loam, very dark grayish brown (2.5Y 3/2) when moist; moderate medium subangular blocky structure;

slightly hard, very friable, sticky and plastic; very few very fine roots; many very fine interstitial pores and few fine and medium tubular pores; violently effervescent with disseminated lime; moderately alkaline; gradual smooth boundary.

C2r—30 to 36 inches; light gray (5Y 7/2) soft calcareous shale.

The A1 horizon commonly is gray or light gray, and chroma is generally 1 but approaches 2 in places. Segregated lime is in the lower part of the A horizon in places. The Cca horizon ranges from light gray to white and is silty clay loam, silt loam, or loam. Depth to calcareous shale or sandstone ranges from 20 to 40 inches.

SmG3—Shedd silt loam, 30 to 75 percent slopes, severely eroded. This is a steep and very steep soil on uplands that have mostly southern exposures. It has a profile similar to the one described as representative of the series, but it is severely eroded. The surface layer commonly is light gray strongly effervescent silt loam; depth to bedrock ranges from 20 to 30 inches; gully, rill, and sheet erosion have removed 30 to 50 percent of the original surface layer; and the soil on most ridges and in canyons or drainageways has been removed by water erosion.

Included with this soil in mapping were areas of Badland and Rock outcrop-Xerorthents association making up 15 to 20 percent of the acreage; areas of Shedd soil that is less than 20 inches deep to bedrock and is light brownish gray, pale brown, or very pale brown, making up 30 to 40 percent; and small areas of Gaviota, San Timoteo, San Andreas, and Arnold soils. Some Shedd soils that are slightly eroded or have 30 to 75 percent slopes and are moderately eroded were also included.

Runoff is very rapid, and the erosion hazard is very high. Roots can penetrate to a depth of 20 to 30 inches. The available water capacity is 3 to 4.5 inches. Because of the very high erosion hazard and very rapid runoff, this soil has a high potential to deposit silt and sediment downslope. At the mouth of some drainageways, deposition occurs once or twice a year.

This soil is used for limited range. Capability unit VIIe–1(15); Loamy range site.

SnD—Shedd silty clay loam, 9 to 15 percent slopes. This is a rolling soil on hills and ridgetops. Depth to bedrock is 30 to 40 inches.

Included with this soil in mapping were small areas of Docas, Linne, Nacimiento and Diablo soils. Also included were some areas of soils that have 5 to 9 percent slopes or are moderately eroded and some soils that are very similar to Shedd soils, but are more than 40 inches deep to bedrock.

Runoff is medium, and the erosion hazard is moderate. Roots can penetrate to a depth of 30 to 40 inches. The available water capacity is 5.5 to 8.5 inches. The surface layer seals over and becomes puddled very easily.

This soil is used for range and dryland grain. Capability unit IVe–1(15); Clayey range site.

SnE—Shedd silty clay loam, 15 to 30 percent slopes. This is a moderately steep soil on uplands that have dominantly southern exposures. It has the profile described as representative of the series. Depth to bedrock is 20 to 30 inches. Slopes are mostly about 20 percent.

Included with this soil in mapping were small areas of Linne, Nacimiento, San Benito, Gazos, and Los Osos soils; small areas of a soil that has a calcareous or noncalcareous, light brownish gray surface layer; a few areas of soils that have slopes of 30 to 40 percent; and some soils that are very similar to Shedd soils, but less than 20 inches or more than 30 inches deep to bedrock. Also included were some areas where erosion is moderate and an average of 25 to 30 percent of the original surface layer has been removed, mostly by sheet and rill erosion. Some gullies in the upper drainageways were also included.

Runoff is rapid, and the erosion hazard is high. Roots can penetrate to a depth of 20 to 30 inches. The available water capacity is 4 to 6 inches.

This soil is used mostly for range, but a few areas are used for dryland grain. Capability unit IVe–1(15); Clayey range site.

SnF2—Shedd silty clay loam, 30 to 50 percent slopes, eroded. This is a steep soil on rolling uplands. Most areas have lost 25 to 30 percent of the original surface layer through erosion. The soil has small rills, exposed bedrock along ridges, and raw or exposed bedrock at the head of most drainageways. Some sheet erosion occurs in most areas. Depth to bedrock is 30 to 40 inches.

Included with this soil in mapping were areas of Shedd silt loam, 30 to 75 percent slopes, severely eroded, making up about 15 percent of the acreage, and areas of this soil that have a hard cemented clay layer above the bedrock making up about 10 percent. Also included were small areas of Linne, Nacimiento, and San Benito soils; a soil that has a noncalcareous or calcareous light brownish gray surface layer; and a similar soil that is less than 20 inches deep to bedrock.

Runoff is rapid, and the erosion hazard is high. Roots can penetrate to a depth of 20 to 30 inches. The available water capacity is 4 to 6 inches. Severe erosion results from overgrazing.

This soil is used for range. Capability unit VIe–1(15); Clayey range site.

Sheridan Series

The Sheridan series consists of well drained soils on hills and mountains. These soils formed in material underlain by granitic and schistose rock. Slopes are 5 to 75 percent. The vegetation is the open grass or grass and oak type or it consists of madrone, scattered Coulter and ponderosa pine, and brush. The elevation is 1,000 to 5,000 feet. The mean annual precipitation is 16 to 50 inches, the mean annual air temperature is 57° to 63° F, and the frost-free season is 170 to 230 days. Summers are warm or hot and dry, and winters are cool and moist.

In a representative profile the surface layer is dark grayish brown, slightly acid coarse sandy loam 39 inches thick. It is underlain by brown and very dark gray, slightly acid weathered granite.

Permeability is moderately rapid, and the available water capacity is 3 to 6 inches. Roots penetrate to a depth of 20 to 40 inches.

Sheridan soils are used mostly for range. Some areas are used for recreation, homesites, wildlife habitat, or watershed.

Representative profile of Sheridan coarse sandy loam,

15 to 30 percent slopes, 3.5 miles east up Johnson Canyon Road from Armstrong Ranch; 250 feet from E¼ corner of SE ¼ sec. 30, T. 15 S., R. 6 E.

A11—0 to 8 inches; dark grayish brown (10YR 4/2) coarse sandy loam, very dark brown (10YR 2/2) when moist; moderate medium and coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; many very fine interstitial pores; upper 1 inch has strong fine and medium granular structure with a mat of very fine roots, rest of horizon is somewhat compacted by trampling; slightly acid; gradual smooth boundary.

A12—8 to 18 inches; dark grayish brown (10YR 4/2) coarse sandy loam, very dark brown (10YR 2/2) when moist; strong medium and coarse granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; many very fine interstitial pores and few fine and medium tubular pores; slightly acid; gradual smooth boundary.

A13—18 to 28 inches; dark grayish brown (10YR 4/2) coarse sandy loam, very dark brown (10YR 2/2) when moist; strong medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; many very fine interstitial pores and few fine tubular pores; slightly acid; gradual smooth boundary.

A14—28 to 39 inches; dark grayish brown (10YR 4/2) coarse sandy loam, very dark grayish brown (10YR 3/2) when moist; strong medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; many very fine interstitial pores and few fine tubular pores; lower part has some indistinct very dark grayish brown (10YR 3/2) lumps of C horizon material; slightly acid; clear wavy boundary.

Cr—39 to 43 inches; brown (7.5YR 5/4) and very dark gray (10YR 3/1) weathered granite that crushes to loamy coarse sand.

The A1 horizon is very dark grayish brown, dark gray, dark grayish brown, or grayish brown, and texture is coarse sandy loam, sandy loam, or light loam. Reaction ranges from medium acid to neutral. There commonly is an A14, AC, or B2 horizon or a C1 horizon that is not weathered bedrock. These horizons are 5 to 15 inches thick. Depth to weathered granite or schist ranges from 20 to 40 inches. Up to 0.1 percent of the surface is covered by stones, and up to 6 percent is rock outcrop. The soil commonly is 10 to 20 percent mostly 2- to 20-millimeter gravel and is high in mica throughout.

SoD—Sheridan coarse sandy loam, 5 to 15 percent slopes. This is a moderately sloping to strongly sloping soil on the lower side slopes of granitic uplands or on small rounded ridgetops.

Included with this soil in mapping were small areas of Narlon soils, mostly on the Monterey Peninsula, and of San Andreas and Pfeiffer soils or other soils that have a clay subsoil. Also included were areas of sandy loams that are less than 20 inches deep or that have a surface layer less than 20 inches thick. In some places about 50 percent of this soil is 40 to 60 inches deep to weathered bedrock.

Runoff is medium, and the erosion hazard is slight.

Most areas of this soil are used for range or building sites. Capability unit IVe–1(15); Granitic range site.

SoE—Sheridan coarse sandy loam, 15 to 30 percent slopes. This is a moderately steep soil on rounded hills. It has the profile described as representative of the series.

Included with this soil in mapping were small areas of Vista, McCoy, Pfeiffer, San Andreas, and Diablo soils; some soils that have a subsoil of sandy clay loam, clay loam, or clay; and some grayish brown sandy loams that are less than 20 inches deep. Also included was a soil that is very similar to this Sheridan soil, but has less than 1 percent organic matter above a depth of 20 inches, which makes up 40 to 50 percent of the acreage in some places. Small areas of Sheridan soils that have 30 to 50 percent slopes or are 40 to 60 inches deep to weathered rock were also included.

Runoff is rapid, and the erosion hazard is moderate.

This soil is used mostly for range. On the Monterey Peninsula and along the coast, some areas are used for homesites. Capability unit VIe–1(15); Granitic range site.

SoG—Sheridan coarse sandy loam, 30 to 75 percent slopes. This is a steep and very steep soil on hills and mountains. The dominant vegetation is oak and grass or grass type. In some areas, however, there are stands of mixed conifers and hardwoods and very little grass.

Included with this soil in mapping were small areas of Vista, McCoy, Cieneba, San Andreas, Pfeiffer, Junipero, and Sur soils. Also included were other brown or dark grayish brown sandy loams that have less than 1 percent organic matter above a depth of 20 inches. In places in the Los Padres National Forest, Sur soils make up about 50 percent of the mapping unit. Some areas of soils that have a clay loam subsoil and areas where stones and rock outcrops cover 0.1 to 5 percent of the surface area were also included.

Runoff is rapid or very rapid, and the erosion hazard is high or very high.

This soil is used mostly for range. Some areas are used for watershed, wildlife habitat, and recreation. On the Monterey Peninsula, some areas are used for building sites. If the annual rainfall is about 30 inches or more, this soil has low productivity for Coulter pine (site index averages about 50 to 60). The seedling mortality is slight or moderate, and the windthrow hazard is slight. The equipment limitation is moderate or severe. Capability unit VIIe–1(15); Granitic range site.

Snelling Series

The Snelling series consists of well drained soils that formed on high terraces or fans in eolian deposits and alluvium derived from sandstone. Slopes are 5 to 30 percent. The vegetation is mainly annual grasses and forbs. The elevation is 300 to 2,000 feet. The mean annual precipitation is 10 to 16 inches, the mean annual air temperature is about 60° F, and the frost-free season is about 250 days. Summers are hot and dry, and winters are cool and moist.

In a representative profile the surface layer is brown, slightly acid sandy loam about 13 inches thick. The subsoil is reddish yellow and very pale brown, slightly acid and neutral sandy clay loam 33 inches thick. The substratum is very pale brown, neutral sandy loam and loamy sand.

Permeability is moderately slow, and the available water capacity is 7 to 10 inches. Roots penetrate to a depth of more than 60 inches.

Snelling soils are used for dryland grain and range.

Representative profile of Snelling sandy loam, in an area of Snelling-Greenfield complex, 9 to 30 percent slopes, eroded, SE of King City about 4 miles east on

Wildhorse Canyon Road from U.S. Highway 101, 0.4 mile north of Copley Ranch headquarters in the center of NW¼SE¼ sec. 8, T. 20 S., R. 9 E.

A11—0 to 2 inches; brown (10YR 5/3) sandy loam, brown (10YR 4/3) when moist; moderate medium platy structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and common fine roots; common very fine tubular pores; slightly acid; abrupt smooth boundary.

A12—2 to 13 inches; brown (10YR 5/3) sandy loam, brown (10YR 4/3) when moist; weak coarse angular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and common fine roots; many very fine, common fine, and few medium tubular and interstitial pores; slightly acid; abrupt smooth boundary.

B2t—13 to 28 inches; reddish yellow (7.5YR 6/6) sandy clay loam, strong brown (7.5YR 5/6) when moist; strong coarse prismatic structure; very hard, firm, sticky and plastic; very few very fine inped roots and common very fine exped roots; few fine and common very fine tubular pores; continuous moderately thick brown (10YR 5/3, 4/3, dry) and yellowish brown (10YR 5/6, moist) clay films on faces of peds, common moderately thick clay films lining pores; slightly acid; clear wavy boundary.

B31t—28 to 35 inches; reddish yellow (7.5YR 6/6) sandy clay loam, strong brown (7.5YR 5/6) when moist; weak medium subangular blocky structure; very hard, firm, sticky and plastic; few very fine roots; few very fine pores; continuous thin brown (10YR 5/3, 4/3, dry) and yellowish brown (10YR 5/6, moist) clay films on faces of peds and common moderately thick clay films lining pores; slightly acid; clear wavy boundary.

B32t—35 to 46 inches; very pale brown (10YR 7/4) sandy clay loam, yellowish brown and brownish yellow (10YR 5/6, 6/6) when moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine pores; common moderately thick clay films lining pores; neutral; clear wavy boundary.

C1—46 to 58 inches; very pale brown (10YR 7/4) sandy loam, yellowish brown and brownish yellow (10YR 5/6, 6/6) when moist; massive; hard, very friable, nonsticky and nonplastic; no roots observed; neutral; clear wavy boundary.

C2—58 to 65 inches; very pale brown (10YR 7/4) loamy sand, yellowish brown and brownish yellow (10YR 5/6, 6/6) when moist; massive; soft, very friable, nonsticky and nonplastic; neutral.

The A1 horizon is brown, yellowish brown, light brownish gray, or light yellowish brown, and texture is sandy loam, fine sandy loam, loam, or heavy sandy loam. Reaction ranges from strictly acid to neutral. When dry, the soil material is slightly hard or hard. Thickness of the A1 horizon is 10 to 19 inches. The boundary between the A and B horizons is abrupt or clear.

The Bt horizon ranges from brown or reddish yellow to very pale brown, and texture is heavy loam or sandy clay loam. Reaction ranges from slightly acid to mildly alkaline.

The C horizon ranges from brownish yellow or very pale brown to pale yellow, and texture is sandy loam, loamy sand, or sand. Reaction ranges from slightly acid to moderately alkaline. Some areas contain lime in the lower part of the Bt horizon and in the C horizon.

SpD—Snelling-Greenfield complex, 5 to 15 percent slopes. The gently rolling to rolling soils in this complex are on fans and wind-modified terraces. They were so intermingled that it was not feasible to map them separately at the scale used.

Snelling soils make up 45 percent of this complex and Greenfield soils 35 percent. The rest consists of Garey, Sorrento, Oceano, Rincon, Docas, and Lockwood soils and Xerorthents, loamy; a grayish brown or dark grayish brown soil similar to Snelling soils; and small areas where erosion is moderate or severe.

Runoff is medium, and the erosion hazard is moderate.

This complex is used for dryland grain and range. Capability unit IIIe-1(15); Snelling soil in Loamy range site, Greenfield soil in Coarse Loamy range site.

SpE2—Snelling-Greenfield complex, 9 to 30 percent slopes, eroded. The rolling to hilly soils in this complex are on fans and dissected terraces. They were so intermingled that it was not feasible to map them separately at the scale used.

Snelling and Greenfield soils each make up about 35 percent of this complex. This Snelling soil has the profile described as representative of the series. Areas of a soil that has a subsoil of sandy loam, clay, or sandy clay and a soil that has a very dark grayish brown or grayish brown surface layer each make up about 10 percent of the complex. The rest is areas of Lockwood, Docas, Garey, Rincon, and Shedd soils; Xerorthents, loamy; and severely eroded areas. Included in the Indian Valley area were small areas of Santa Lucia, Los Osos, and Chamise soils and some soils that are medium acid.

Runoff is medium, and the erosion hazard is high.

This complex is used mostly for range. Areas of long fans are used for dryland grain. Capability unit IVe-1(15); Snelling soil in Loamy range site, Greenfield soil in Coarse Loamy range site.

Sorrento Series

The Sorrento series consists of well drained soils that formed on flood plains and fans in alluvium derived from sandstone and shale. Slopes are 0 to 9 percent. The vegetation consists of annual grasses and forbs and a few scattered oaks. The elevation is 500 to 2,400 feet. The mean annual precipitation is 12 to 20 inches, the mean annual air temperature is 59° to 60° F, and the frost-free season is generally about 250 days, but is about 175 days in Priest Valley. Summers are hot and dry, and winters are cool and moist.

In a representative profile the surface layer is grayish brown, mildly alkaline and moderately alkaline clay loam about 25 inches thick. The underlying material is calcareous, brown and pale brown, moderately alkaline loam 29 inches thick. At a depth of 54 inches is pale brown, calcareous stratified silt loam, silt, and loam that extends to a depth of 78 inches or more.

Permeability is moderately slow, and the available water capacity is 11 to 13 inches. Roots penetrate to a depth of more than 60 inches.

Sorrento soils are used mostly for dryland grain. A few areas are used for irrigated row crops.

Representative profile of Sorrento clay loam, 2 to 9 percent slopes, east of King City near Lonoak in Peachtree Valley; 2,000 feet south on State Highway 25 from Lonoak Road and about 600 feet west on the ranch road; 20 feet south into field in SW¼SE¼ sec. 13, T. 18 S., R. 9 E.

Ap—0 to 6 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) when moist; moderate fine and medium subangular blocky structure; hard, friable, sticky and plastic; common

very fine roots; common very fine and fine and few medium tubular pores; mildly alkaline; abrupt smooth boundary.

A12—6 to 15 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) when moist; weak coarse subangular blocky structure; hard, friable, sticky and plastic; few very fine roots; many very fine and fine and common medium tubular pores; mildly alkaline; clear wavy boundary.

A13—15 to 25 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) when moist; weak coarse subangular blocky structure; hard, very friable, sticky and plastic; few very fine roots; many very fine and fine and few medium tubular pores; moderately alkaline; gradual irregular boundary.

C1—25 to 36 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) when moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; many very fine and fine and few medium tubular pores; moderately alkaline; gradual irregular boundary.

C2—36 to 54 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) when moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; many very fine and fine and few medium tubular pores; strongly effervescent with disseminated lime; moderately alkaline; gradual wavy boundary.

C3—54 to 78 inches; pale brown (10YR 6/3) stratified silt loam, silt, and loam, brown (10YR 4/3) when moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; no roots observed; many very fine and fine tubular pores; strongly effervescent with disseminated lime; moderately alkaline.

The A horizon is grayish brown and brown. Texture commonly is clay loam, but ranges to heavy sandy loam, loam, silt loam, or silty clay loam in places. Reaction is neutral, mildly alkaline, or moderately alkaline in the upper 20 inches.

The C horizon is brown, light grayish brown, light brownish gray, light gray, or pale brown. Texture is fine sandy loam, silt, loam, or silt loam. Lime commonly occurs at a depth of 36 inches, but ranges from 20 to 40 inches in places.

SrA—Sorrento clay loam, 0 to 2 percent slopes. This is a nearly level soil on flood plains. Slopes are mostly about 1 percent.

Included with this soil in mapping were small areas of Mocho, Docas, Rincon, Pico, and Cropley soils. A few areas that have slopes of somewhat more than 2 percent were also included.

Runoff is slow, and the erosion hazard is minimal.

This soil is used mostly for dryland grain in the southeastern part of the county and for irrigated row crops in the Salinas Valley. Capability units I(14), IIIc–1(15); range site not assigned.

SrC—Sorrento clay loam, 2 to 9 percent slopes. This is a gently sloping soil on alluvial fans and flood plains. It has the profile described as representative of the series.

Included with this soil in mapping were small areas of Salinas, Mocho, Pico, Metz, Cropley, and Docas soils; a soil that is very similar to Sorrento soils, but has a sandy loam texture; and some Sorrento soils that have slopes of less than 2 percent. In some narrow valleys, Tujunga and Hanford soils were also included.

Runoff is medium or slow, and the erosion hazard is slight.

This soil is used mostly for dryland barley in the southeastern part of the county and for irrigated row crops in the Salinas Valley. Capability units IIe–1(14), IIIe–1(15); range site not assigned.

Sur Series

The Sur series consists of somewhat excessively drained soils on uplands. These soils formed in material underlain by schistose, gneissic, or granitic bedrock or by fractured sandstone or shale. Slopes are 50 to 85 percent. The vegetation consists of canyon live oak, tanoak, madrone, laurel, Coulter and ponderosa pine, and, on southern exposures, mainly sprouting manzanitas, buckbrush, and chamise. The elevation is 400 to 5,500 feet. The mean annual precipitation is 30 to 75 inches, but ranges to as much as 100 inches on some ridges; some snow remains on a few high peaks and ridges for 2 to 8 weeks. The mean annual air temperature is about 54° F, and the frost-free season is 200 to 300 days. Summers are warm and dry, and winters are cool and moist.

In a representative profile the surface layer is very dark grayish brown, slightly acid stony sandy loam about 7 inches thick. It is underlain by brown slightly acid stony sandy loam. Fractured schist is at a depth of 24 inches.

Permeability is moderately rapid, and the available water capacity is 1.5 to 3 inches. Roots penetrate to a depth of 20 to 40 inches.

Sur soils are used for watershed, wildlife habitat, and recreation.

Representative profile of Sur stony sandy loam, in an area of Sur-Junipero complex, 1.1 miles east of the summit on Nacimiento-Ferguson Road. The site is about 0.3 mile NE from Carrals Springs, in SE corner of SE¼ sec. 17, T. 22 S., R. 5 E.

O1&O2—2 inches to 0; litter of oak, tanoak, laurel, and madrone leaves and twigs; slightly acid; abrupt wavy boundary.

A1—0 to 7 inches; very dark grayish brown (10YR 3/2) stony light sandy loam, very dark brown (10YR 2/2) when moist; moderate medium and fine crumb structure and some single grained; soft, very friable, nonsticky and nonplastic; common very fine roots; common fine tubular pores and many very fine and fine interstitial pores; 3 percent subangular surface stones and cobblestones and 5 to 10 percent subangular gravel mostly 2 to 20 millimeters, but ranging to 60 millimeters; slightly acid; clear wavy boundary.

C—7 to 24 inches; brown (7.5YR 5/4) stony light sandy loam, dark brown (7.5YR 4/4) when moist; weak medium subangular blocky structure and weak fine crumb structure; soft, very friable, nonsticky and nonplastic; many fine, medium, and coarse roots; many very fine interstitial pores and common fine and many very fine tubular pores; 40 percent subangular stones, cobblestones, and gravel; coarse fragment content increases with increasing depth; slightly acid; clear irregular boundary.

R—24 to 30 inches; fractured schist.

The O horizon ranges from medium acid to neutral. There is no O horizon in areas that have sparse vegetation or areas disturbed by rock slides or soil or animal movement.

The A1 horizon is dark grayish brown, very dark grayish brown, grayish brown, brown, dark gray, or gray. It is very dark brown, dark brown, and very dark grayish brown when moist, and in some profiles the lower part of the A1 horizon is dark grayish brown when moist. This horizon is 7 to 20 inches thick. Texture is sandy loam or coarse sandy loam. Coarse fragments or rock outcrops cover 0.5 to 25 percent of the surface. Consistence is soft or slightly hard, and reaction is medium acid to neutral. In some profiles an AC horizon underlies the A1 horizon and is up to 18 inches thick. The AC horizon is brown or yellowish brown gravelly,

cobbly, or stony coarse sandy loam, sandy loam, or fine sandy loam. It has granular structure or is massive. Reaction is medium acid to neutral.

The C horizon is brown, light brown, pale brown, or light yellowish brown. Texture is sandy loam or coarse sandy loam that contains 35 to 85 percent stones, cobblestones, and gravel. The content of rock fragments increases with increasing depth. The C horizon is typically slightly acid, but ranges from medium acid to neutral. Depth to bedrock is 20 to 40 inches. Bedrock is mostly schist of the Sur Formation or other schist, shale, gneiss, granodiorite, sandstone, shale, and coarse grained metamorphic rock.

Ss—Sur-Junipero complex. This mapping unit consists of very steep and extremely steep soils on mountains, mostly in the Los Padres National Forest and the Ventana Wilderness. Exposure is generally to the north. Slopes are 50 to 85 percent. The soils were so intermingled that it was not feasible to map them separately at the scale used.

Sur soils make up about 60 percent of this complex and Junipero soils 20 percent. The rest consists of a dark grayish brown sandy loam that is less than 20 inches deep to bedrock; a very dark brown sand that is 25 to 30 inches thick; and a soil that is similar to Sur or Junipero soils, but has a strongly acid or very strongly acid surface layer. Many areas up to 10 acres in size of rock outcrop were also included, mostly in areas underlain by schist or gneiss.

Runoff is rapid or very rapid, and the erosion hazard is high or very high.

This complex is used mostly for recreation, wildlife habitat, and watershed. It is also used for Coulter pine, and some areas are more favorable for ponderosa pine or redwood species that have appreciably higher site indexes than Coulter pine. The Sur soil has low productivity for Coulter pine (site index averages about 50). The seedling mortality is moderate, and the windthrow hazard is slight. The Junipero soil has moderate productivity (site index averages about 70 to 80). The seedling mortality is slight, and the windthrow hazard is slight. The equipment limitation is severe for both soils. Most areas are accessible only by foot trail or on horseback. Capability unit VIIIe–1(15); range site not assigned.

St—Sur-Plaskett complex. This complex consists of very steep soils on mountains, mainly in the Los Padres National Forest. Exposure is to the north and east. Slopes are 50 to 75 percent. These soils were so intermingled that it was not feasible to map them separately at the scale used.

Sur soils make up about 50 percent of this complex and Plaskett soils 25 percent. A pale brown, medium acid very shaly sandy loam that is less than 20 inches deep to bedrock makes up about 15 percent. The rest consists of areas of McMullin and Junipero soils and areas mostly near ridge crests that have slopes of 30 to 50 percent.

Runoff is very rapid, and the erosion hazard is very high.

This complex is used mostly for recreation, watershed, and wildlife habitat. A few areas are used for grazing or woodland. Both soils have low productivity for Coulter pine (site index averages about 50). The seedling mortality is moderate for both soils, and the windthrow hazard is slight for Sur soils and moderate for Plaskett soils. The equipment limitation is severe for both soils. Capability unit VIIe–1(15); range site not assigned.

Tangair Series

The Tangair series consists of somewhat poorly drained soils that formed on wind-modified terraces in sand that is about half quartz and half feldspar. Slopes are 2 to 9 percent. The vegetation consists of Monterey pine, live oak, dryland sedge, bracken fern, wild blackberry, wild iris, rushes, and some grass. The elevation is 40 to 250 feet. The mean annual precipitation is 17 to 18 inches, the mean annual air temperature is about 56° F, and the frost-free season is about 300 days. Summers are mainly warm and dry, though they are often foggy, and winters are cool and moist.

In a representative profile the surface layer is gray, neutral and slightly acid fine sand about 10 inches thick. The subsurface layer is light gray and white, slightly acid fine sand 14 inches thick. The subsoil is very pale brown, slightly acid fine sand 21 inches thick. The substratum is light gray, pale brown, and light yellowish brown, slightly acid fine sandy loam that extends to a depth of more than 60 inches.

Permeability is rapid, and the available water capacity is 3.5 to 4.5 inches. Roots penetrate to a depth of more than 60 inches. Depth to the water table ranges from 20 to 60 inches.

Tangair soils are used for homesites, golf courses, and have very limited use for woodland.

Representative profile of Tangair fine sand, 2 to 9 percent slopes, inside the Del Monte Forest; 200 feet west from Bird Rock Road and 20 feet north of Hacienda Drive.

O1&O2—2 inches to 0; mostly pine needle litter and some oak and grass litter; medium acid; clear smooth boundary.

A11—0 to 4 inches; gray (10YR 5/1) fine sand, very dark gray (10YR 3/1) when moist; weak fine granular structure; soft, friable, nonsticky and nonplastic; many very fine and common fine and medium roots; many very fine tubular and interstitial pores; neutral; gradual wavy boundary.

A12—4 to 10 inches; gray (10YR 6/1) fine sand, dark gray (10YR 4/1) when moist; massive; slightly hard, friable, nonsticky and nonplastic; common very fine and fine, many medium, and common coarse roots; many very fine tubular and interstitial pores; slightly acid; gradual wavy boundary.

A21—10 to 19 inches; light gray (10YR 7/1) fine sand, grayish brown (10YR 5/2) when moist; massive; soft, friable, nonsticky and nonplastic; few very fine, fine, and medium roots; many very fine interstitial pores; 2 percent concretions; slightly acid; gradual wavy boundary.

A22—19 to 24 inches; white (10YR 8/1) fine sand, light brownish gray (10YR 6/2) when moist; massive; slightly hard, friable, nonsticky and nonplastic; few very fine, fine, and medium roots; common very fine interstitial pores; 2 percent concretions; slightly acid; clear wavy boundary.

B21ir—24 to 38 inches; very pale brown (10YR 7/3) fine sand, yellowish brown (10YR 5/6) when moist; common fine faint light yellowish brown (10YR 6/4) mottles; massive; slightly hard, friable, nonsticky and nonplastic; very few very fine and fine roots; common very fine interstitial pores; 8 percent concretions; slightly acid; diffuse wavy boundary.

B22ir—38 to 45 inches; very pale brown (10YR 7/4) fine sand, light yellowish brown (10YR 6/4) when moist; concretions are very dark gray, dark gray,

and dark brown (10YR 3/1, 10YR 4/1, and 7.5YR 4/4); massive; slightly hard, friable, nonsticky and nonplastic; few very fine and fine roots; common very fine interstitial pores; 12 percent concretions; slightly acid; gradual wavy boundary.

C—45 to 62 inches, mixed light gray, pale brown, and light yellowish brown (10YR 7/2, 6/3; 2.5Y 6/4) fine sandy loam, light brownish gray (2.5Y 6/2) and yellowish brown (10YR 5/6) when moist; yellowish brown (10YR 5/4) and brown (10YR 4/3) mottles; massive; slightly hard, friable, nonsticky and nonplastic; very few very fine and fine roots; common very fine interstitial pores; slightly acid.

The A1 horizon is gray, grayish brown, or light brownish gray, and texture is sand, fine sand, loamy sand, loamy fine sand, or fine sandy loam. Reaction ranges from very strongly acid to neutral. The A2 horizon is light gray, white, or very pale brown, and texture is fine sand or loamy fine sand. Reaction is medium acid to mildly alkaline.

The B2ir horizon ranges from light gray or white to very pale brown. Mottles commonly are brown, pale brown, yellowish brown, or light yellowish brown. Hue is typically 10YR, but it is 7.5YR to 2.5Y in places; moist rubbed color is 7.5YR. Texture of the B2ir horizon is sand, fine sand, loamy sand, or loamy fine sand. In places there are thin lenses of loamy very fine sand, or fine sandy loam below a depth of 40 inches. Reaction ranges from very strongly acid to slightly acid.

TaC—Tangair fine sand, 2 to 9 percent slopes. This is a gently sloping and moderately sloping soil on partly dissected marine terraces. It has the profile described as representative of the series.

Included with this soil in mapping were small areas of Baywood and Narlon soils. Soils that are similar to Tangair soils, but have a sandy clay loam or clay subsoil at a depth of 24 to 40 inches, and soils that have a dark gray and gray surface layer more than 10 inches thick make up about 15 percent of the acreage. Also included were soils that are similar to Tangair soils, but are neutral or mildly alkaline or have less than 8 percent concretions in the subsoil.

Runoff is slow, and the erosion hazard is slight.

This soil is used mostly for woodland, homesites, and golf courses. It has low productivity for Monterey Pine (site index averages about 45 to 50). The seedling mortality and plant competition are severe. The windthrow hazard and equipment limitation are moderate. Capability units IIIw-4(14); IVw-4(15); range site not assigned.

Tujunga Series

The Tujunga series consists of excessively drained soils that formed in mixed alluvium derived from granitic and sedimentary rocks on flood plains and alluvial fans. Slopes are 0 to 5 percent. The vegetation consists of annual grasses, forbs, and a few scattered oaks, willows, and sycamore. The elevation is 200 to 1,200 feet. The mean annual precipitation is 12 to 15 inches, the mean annual air temperature is about 59° F, and the frost-free season is 220 to 250 days. Summers are hot and dry, and winters are cool and moist.

In a representative profile the surface layer is light brownish gray, slightly acid fine sand about 10 inches thick. It is underlain by pale brown and light gray, slightly acid and mildly alkaline fine sand and sand that extends to a depth of more than 60 inches.

Permeability is rapid, and the available water capacity is 2.5 to 4 inches. Roots penetrate to a depth of more than 60 inches.

Tujunga soils are used mostly for dryland grain and pasture.

Representative profile of Tujunga fine sand, 0 to 5 percent slopes, about 5 miles SW of Carmel Valley Village on the Carmel Valley-Greenfield Road; 0.8 mile west from Tularcitos Creek; in about the center of NE¼ sec. 20, T. 17 S., R. 3 E.

A1—0 to 10 inches; light brownish gray (10YR 6/2) fine sand, dark grayish brown (10YR 4/2) when moist; massive; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine interstitial pores; 10 percent 2- to 5-millimeter shale and granitic fragments; slightly acid; gradual smooth boundary.

C1—10 to 24 inches; pale brown (10YR 6/3) fine sand, dark grayish brown (10YR 4/2) when moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and very few fine roots; many very fine interstitial pores; 10 percent 2- to 5-millimeter shale and granitic fragments; slightly acid; clear smooth boundary.

C2—24 to 42 inches; light gray (10YR 7/2) fine sand, dark grayish brown (10YR 4/2) when moist; common fine faint dark grayish brown and dark yellowish brown (10YR 4/2, 4/4) mottles; few krotovinas filled with very dark gray (10YR 3/1) loam, very dark grayish brown (10YR 3/2) when moist; massive; soft, very friable, nonsticky and nonplastic; few very fine and very few fine roots; many very fine interstitial pores; 10 percent 2- to 5-millimeter shale and granitic fragments; mildly alkaline; clear wavy boundary.

C3—42 to 60 inches; light gray (10YR 7/1) sand, grayish brown (10YR 5/2) when moist; massive; soft, very friable, nonsticky and nonplastic; no roots observed; many very fine interstitial pores; 5 to 10 percent 2- to 15-millimeter coarse fragments; mildly alkaline.

The A1 horizon is grayish brown, light brownish gray, or light gray, and texture is coarse sand, sand, fine sand, loamy coarse sand, loamy sand, or loamy fine sand. Reaction ranges from slightly acid to mildly alkaline.

The C horizon is light gray to pale brown. Texture is coarse sand, sand, fine sand, loamy coarse sand, loamy sand, or loamy fine sand and is commonly stratified. The strata are loamy fine sand or coarser at a depth of 10 to 40 inches. Gravel content throughout the profile ranges from 5 to 15 percent, and it consists of siliceous shale and granitic fragments.

TbB—Tujunga fine sand, 0 to 5 percent slopes. This is a level and undulating soil on flood plains and alluvial fans, mainly in small, narrow areas along drainageways. Slopes are mostly 3 percent.

Included with this soil in mapping were areas of Gorgonio or Arroyo Seco soils making up about 10 percent of the acreage and small areas of Hanford and Metz soils. Also included were areas where gravelly and sandy overwash is 10 to 20 inches thick and areas of Psamments and Fluvents.

Runoff is very slow. The erosion hazard is slight, but some channel erosion occurs. This soil is subject to channeling and deposition along drainageways.

This soil is used for dryland grain and pasture. Capability units IVe-4(14), IVe-4(15); range site not assigned.

Vista Series

The Vista series consists of well drained soils on uplands. These soils formed in material underlain by

granitic or schistose rock. Slopes are 5 to 75 percent. The vegetation consists mostly of annual grasses and forbs and scattered oaks and brush. The elevation is 500 to 3,500 feet. The mean annual precipitation is 12 to 18 inches, the mean annual air temperature is 60° to 64° F, and the frost-free season is about 250 days. Summers are hot and dry, and winters are cool and moist.

In a representative profile the surface layer is brown, medium acid coarse sandy loam about 12 inches thick. The subsoil is light brown, medium acid coarse sandy loam 11 inches thick. It is underlain at a depth of 23 inches by the substratum of weathered granite.

Permeability is moderately rapid.

Vista soils are used for range.

Representative profile of Vista coarse sandy loam, 30 to 75 percent slopes, about 4 miles NE of Gonzales, 0.5 mile NE up ridge from Armstrong Ranch corrals on Johnson Canyon Road, 300 feet west. The corrals are on the southern side of Johnson Canyon Road about 1.5 miles from Iverson Road.

O1—1 inch to 0; litter of dead grass and root mat; clear smooth boundary.

A1—0 to 12 inches; brown (10YR 5/3) coarse sandy loam, dark brown (10YR 3/3) when moist; weak fine granular structure; slightly hard, very friable, nonsticky and nonplastic; many very fine and few medium roots; common very fine and medium tubular and interstitial pores; 10 percent 2- to 5-millimeter gravel; medium acid; clear smooth boundary.

B2—12 to 23 inches; light brown (7.5YR 6/4) coarse sandy loam, dark brown (7.5YR 4/4) when moist; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine and few medium roots; common very fine and coarse tubular and interstitial pores; few thin clay films on mineral grains and bridging mineral grains; 15 percent gravel; medium acid; clear smooth boundary.

Cr—23 to 30 inches; weathered granite; few very fine roots in fractures; slightly acid.

The A1 horizon is dark grayish brown, grayish brown, or brown, and commonly has chroma of 3 or 4 when moist. Texture is coarse sandy loam or sandy loam that is 10 to 30 percent fine gravel 2 to 5 millimeters in diameter. The A1 horizon is massive or has granular or subangular blocky structure. When dry, the soil material ranges from soft to hard and can be both massive and hard. Reaction ranges from strongly acid to neutral.

The B2 horizon is yellowish brown, brown, light brown, pale brown, or very pale brown. Texture is coarse sandy loam or sandy loam, and reaction ranges from medium acid to neutral. Depth to weathered and fractured granite or schist ranges from 20 to 36 inches. Stones and rock outcrop cover about 1 to 10 percent of the surface area.

VaD—Vista coarse sandy loam, 5 to 15 percent slopes. This is a gently rolling and rolling soil on hills. It is strongly acid to slightly acid, and stones and rock outcrops cover 0.5 to 2 percent of the surface area.

Included with this soil in mapping were small areas of Cieneba, Chualar, Arroyo Seco, Gloria, McCoy, Placentia, Gilroy, and Sheridan soils.

Runoff is medium and the erosion hazard is moderate. Roots can penetrate to a depth of 20 to 36 inches. The available water capacity is 2 to 5 inches.

This soil is used mostly for range. Small areas are used for grain hay. Capability unit IVe–1(15); Granitic range site.

VaE—Vista coarse sandy loam, 15 to 30 percent slopes. This soil is on hilly uplands. Stones and rock outcrops cover 1 to 3 percent of the surface area.

Included with this soil in mapping were areas of Sheridan soils making up about 15 percent of the acreage and small areas of a soil that has a subsoil of clay loam or clay. Also included were small areas of McCoy and Cieneba soils and Vista soils that have slopes of less than 15 or more than 30 percent. Included on the west side of the Salinas Valley were small areas of sandy loams that are less than 20 inches deep.

Runoff is medium, and the erosion hazard is moderate. Roots can penetrate to a depth of 20 to 36 inches. The available water capacity is 2 to 5 inches.

This soil is used mostly for range. Capability unit VIe–1(15); Granitic range site.

VaG—Vista coarse sandy loam, 30 to 75 percent slopes. This is a steep and very steep soil on ridges. It has the profile described as representative of the series. Cobblestones, stones, and rock outcrops cover up to 10 percent of the surface. Slopes are mostly 35 to 50 percent.

Included with this soil in mapping were areas of Sheridan soils making up about 15 percent of the acreage, areas of Cieneba soils making up 10 percent, and small areas of Gilroy and McCoy soils and Rock outcrop-Xerorthents association. Also included were small areas that have slopes of less than 30 or more than 75 percent and areas of soils that have a subsoil of sandy clay loam or clay.

Runoff is rapid, and the erosion hazard is high. Roots can penetrate to a depth of 20 to 36 inches. The available water capacity is 2 to 5 inches.

This soil is used for range, watershed, and wildlife habitat. Capability unit VIIe–1(15); Granitic range site.

Vb—Vista-Rock outcrop complex. The moderately steep to very steep soil in this complex is on hills and mountains. Rock outcrop generally consists of granitic rock that covers an area of a few hundred square feet to 5 acres. Slopes are 30 to 75 percent. Areas of soil and rock were so intermingled that it was not feasible to map them separately at the scale used.

Vista soils make up about 45 percent of this complex and Rock outcrop 30 percent. Cieneba soils make up 15 percent. The rest consists of small areas of Sheridan, McCoy, and San Timoteo soils; soils that have a surface layer of stony sandy loam; and soils that are very similar to Vista soils, but have no subsoil or have a subsoil of sandy loam or clay loam.

On the Vista soil, runoff is rapid, and the erosion hazard is high. Roots can penetrate to a depth of 20 to 30 inches, and the available water capacity is 2 or 3 inches. Cobblestones and stones cover 5 to 10 percent of the surface. On the Rock outcrop, runoff is very rapid, but the erosion hazard is slight.

This complex is used for range, wildlife habitat, and watershed. Capability unit VIIs–1(15); Granitic range site.

Xererts-Xerolls Complex

Xa—Xererts-Xerolls complex. This mapping unit is on steep and very steep hillsides, commonly on uplands near recent faults or along contacts between geological formations. The soils range from somewhat poorly

drained to well drained. The elevation ranges from 400 to 3,000 feet. Slopes are 30 to 75 percent.

The soils consist of masses of loam, silty clay loam, clay loam, and clay material and rock fragments and other unconsolidated materials that have moved downslope. Landslides of soil material commonly have an uneven, concave-convex topography, which appears as steps or small benches on the soil surface. The lower part of the soil profile or substratum is exposed as scars where the soil mass broke away from its original position. The slippage occurs during or after long rains when the soils are saturated with water. Many springs, seeps, and small ponds are on the landscape. Older landslides that have become relatively stable have a cover of annual grasses.

Included in mapping were small areas of Climara, Diablo, and Montara soils, Badland, and Rock outcrop-Xerorthents association.

Runoff is slow to very rapid, and permeability is slow. The erosion hazard is high and very high. Roots can penetrate to a depth of 40 to 60 inches. The available water capacity is 6 to 11.5 inches for Xererts and 7 to 13 inches for Xerolls.

Some areas of this complex are used for range, watershed, and wildlife habitat. It has limited use for the construction of fences, roads, and other structures, because the soil material is unstable. Capability unit VIIe-1(15); Clayey range site.

Xerorthents

Xb—Xerorthents, sandy. These well drained, strongly sloping to steep soils are on banks and escarpments in areas of abrupt changes in elevation between different levels of alluvial fans or terraces. The elevation ranges from 50 to 1,500 feet. The annual precipitation ranges from 10 to 25 inches. The vegetation consists of bromes, fescues, filarees, wild oats, forbs, some patches of scattered brush, and a few scattered oaks.

These soils are sands, loamy sands, sandy loams, and loams. They are high in content of sand and coarse sand and low in silt and clay. Some places are gravelly or cobbly. The clay subsoil of the Gloria or Placentia soils is exposed in places. Some areas also have the cemented substratum exposed along banks near drainageways. The alluvium in Xerorthents, sandy, is derived mostly from granite, schist, or gneiss. Reaction ranges from strongly acid to neutral. The escarpments are relatively stable; they are affected very little by erosion and produce little sediment.

Included in mapping were small areas of Badland, Xerorthents, loamy, and Chualar soils that have slopes of 9 to 20 percent.

Permeability is moderately rapid. Runoff and the erosion hazard vary considerably over very short distances. Roots can penetrate to a depth of about 24 to 60 inches. The available water capacity is about 1.5 to 6 inches.

This land is used for annual range or is left idle. Capability unit VIIe-1(15); Sandy range site.

Xc—Xerorthents, loamy. These well drained, moderately steep and steep soils are on bluffs and banks along major rivers, on escarpments of terraces, on fans or alluvial plains, and along drainageways. Slopes commonly are 15 to 50 percent, but are 9 percent along narrow escarpments that have only a few feet of relief. The elevation ranges from 20 to 2,000 feet, but is mostly below 1,000 feet. The annual precipitation ranges from 10 to 25 inches. The vegetation consists of bromes, bur clover, wild oats, fescues, lupine, forbs, and some brush.

These soils are loams, silt loams, clay loams, and clays. They are high in content of silt and clay and very low in coarse sand. They have very few pebbles or cobbles. The soils commonly are calcareous, and reaction ranges from slightly acid to moderately alkaline. The escarpments are relatively stable and are little affected by erosion. Because slopes are vegetated, only minor amounts of sediment are produced.

Included in mapping were small areas of Badland and Xerorthents, sandy. Also included were areas of Salinas, Mocho, and Cropley soils in narrow areas where changes in elevation are abrupt. These narrow areas commonly have no native vegetation and are cultivated.

Permeability is moderately slow. Runoff and the erosion hazard are variable. Roots can penetrate to a depth of more than 60 inches. The available water capacity is about 6 to 9 inches.

This land is used for annual range or is left idle. Capability unit VIe-1(15); Fine Loamy range site.

Xd—Xerorthents, dissected. These are steep to extremely steep soils on bluffs along major rivers, on steep escarpments of fans and terraces, and on the banks of deeply entrenched streams and gullies that have narrow bottoms. Slopes are typically 50 to 65 percent, but range from 35 to 90 percent. The elevation ranges from 200 to 2,500 feet. The annual precipitation ranges from 12 to 40 inches. The vegetation consists of sparse annual grasses and forbs, brush, and some scrub oaks and digger pine.

These soils consist mostly of unconsolidated or weakly consolidated alluvium that commonly contains pebbles, cobblestones, and stones. Textures are mostly sandy loam or coarse sandy loam and are gravelly or cobbly. The banks are commonly moderately eroded and have areas of severe erosion. The potential for erosion and deposition of soil material is high.

Included in mapping were small areas of Gloria, Chualar, Chamise, Arroyo Seco, Pinnacles, and Santa Lucia soils, Badland, and Xerorthents, sandy. Also included were areas of Tujunga, Hanford, or Gorgonio soils on small, narrow, alluvial bottoms. Some areas of Rock outcrop and areas where the indurated substratum is exposed were included along the banks.

Runoff is rapid and very rapid, and the erosion hazard is high or very high. Drainage, subsoil permeability, depth of the root zone, and available water capacity all vary within short distances.

This land is used for watershed, wildlife habitat, and annual range for limited grazing. Some areas are used for building sites. There is a potential hazard of sediment deposition onto adjacent roads and land. Capability unit VIIe-1(15); Loamy range site.

Use and Management of the Soils

This soil survey is a detailed analysis and evaluation of the most basic resource of the survey area—the soil. It may be used to relate the use of the land, includ-

ing urbanization, to the limitations and potentials of the natural resources and the environment and to help avoid soil-related failures in uses of the land.

During a soil survey, soil scientists, conservationists, engineers, and others keep extensive notes, not only about the nature of the soils but also about unique aspects of behavior of these soils in the field and at construction sites. These notes include observations on erosion, drought damage to specific crops, yield estimates, flooding, the functioning of septic systems, and other factors relating the kinds of soil to their productivity, potentials, and limitations under various uses and levels of management. In this way field experience, as well as measured data on soil properties and performance, is used as a basis for predicting soil behavior.

Information in this section can be used in applying basic facts about the soils to plans for use and management of soils for crops, for pasture, range, and woodland, and for many nonfarm uses, including building sites, highways and other transportation systems, sanitary facilities, parks and other recreational developments, and wildlife habitat. From the data presented, the potential of each soil for specified land uses can be determined, soil limitations can be identified, and costly failures that result from building homes and other structures on unsuitable soils can be avoided. A site with favorable soil properties can be selected, or practices to overcome the soil limitations can be planned.

Planners and others using the soil survey can evaluate the impact of specific land uses on the overall productivity of the survey area, or other broad planning area, and on the environment, both of which are closely related to the nature of the soil. Plans can be made to maintain or create a land use pattern in harmony with the natural soil.

Contractors can find information useful in locating sources of sand and gravel, road fill, and topsoil and in indicating areas of bedrock, wetness, or very firm soil horizons that are difficult to excavate.

Health officials, highway officials, engineers, and many other specialists can find useful information in this soil survey. The safe disposal of wastes, for example, is closely related to properties of the soil. Pavements, sidewalks, campsites, playgrounds, lawns, trees and shrubs, and most other land uses are influenced by the nature of the soil.

Capability Classes and Subclasses

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The soils are grouped according to their limitations when they are used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops that require special management. This classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for range, for forest trees, or for engineering purposes.

In the capability system, all soils are grouped at three levels: capability class, subclass, and unit. These levels are defined in the following paragraphs.

CAPABILITY CLASSES, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, defined as follows:

- Class I soils have few limitations that restrict their use.
- Class II soils have moderate limitations that reduce the choice of plants or require moderate conservation practices.
- Class III soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.
- Class IV soils have very severe limitations that reduce the choice of plants, require very careful management, or both.
- Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.
- Class VI soils have severe limitations that make them generally unsuitable for cultivation.
- Class VII soils have very severe limitations that make them unsuitable for cultivation.
- Class VIII soils and landforms have limitations that nearly preclude their use for commercial plants.

CAPABILITY SUBCLASSES are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w*, *s*, and *c*, because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use to pasture, range, woodland, wildlife habitat, or recreation.

CAPABILITY UNITS in classes I through IV in California are given Arabic numbers that suggest the chief kind of limitation responsible for placement of the soils in the capability class and subclass. For this reason, some of the units within the subclasses are not numbered consecutively, and their symbols are a partial key to some of the soil features. The numerals used to designate units within the classes, except class I, and subclasses are:

0. A problem or limitation caused by sand and gravel in the substratum that limits root penetration.
1. Accelerated or potential erosion hazard.

2. A problem or limitation of wetness caused by poor drainage or flooding.
3. A problem or limitation caused by slow or very slow permeability of the subsoil or substratum.
4. A problem or limitation caused by coarse soil texture or excessive gravel.
5. A problem or limitation caused by a fine textured or very fine textured surface layer.
6. A problem or limitation caused by salt or alkali.
7. A problem or limitation caused by cobbles, stones, or rocks.
8. A problem or limitation caused by nearly impervious bedrock or hardpan within the effective rooting depth.
9. A problem or limitation caused by low fertility or by toxicity.

Soils in classes V through VIII are given the nonconnotative number 1. Where these soils are used for range or woodland, they are discussed in more detail under the respective sections.

Land resource areas

In Monterey County, capability classification is further refined by designating the land resource area in which the soils in a unit occur (*5*). A land resource area is a broad geographic area that has a distinct combination of climate, soils, vegetation, management needs, and kinds of crops that can be grown. The 48 conterminous States in the Nation have been divided into 156 land resource areas. Parts of two of these are in Monterey County. These areas and their numbers are Central California Valleys (14), and Central California Coastal Range (15). The number of the resource area is added in parentheses to the class, subclass, and unit designation, for example, IIe–1 (14).

Land Resource Area 14.—This land resource area includes the lower half of Pajaro Valley, Carmel Valley, and Salinas Valley and its tributaries including Peach Tree, Long, Indian, Vineyard Canyon, Lockwood, and Hames Valleys. Salinas Valley is the major valley. This resource area is made up of alluvial flood plains, gently sloping terraces, fans, and rounded hills on both sides of the valleys. The elevation ranges from sea level to about 1,000 feet in the fringe foothills.

The soils of Salinas Valley and other inland valleys are broadly characterized as:

1. Somewhat poorly drained to poorly drained clays in the valley trough, near sea level, some of which are saline near the coast.
2. Well drained sandy loams to silty clay loams on the valley floors and recent alluvial fans.
3. Well drained to moderately well drained loams and sandy loams on the younger, low terraces.
4. Well drained to moderately well drained soils that have a surface layer of loam and sandy loam and a subsoil of very slowly permeable clay.
5. Excessively drained sands and loamy sands of marine-eolian origin, some of which are acid.
6. Well drained, moderately deep to deep loams to clays on hills of the valley border.

Some of the major factors that limit the use of soils in valleys are:

1. Somewhat poor drainage to poor drainage at the lower ends of the valley and in valley troughs.
2. Difficulty of maintaining soil structure, tilth, drainage, and organic-matter content on the very intensively cropped soils.
3. Flooding, deposition, and bank cutting along streams, particularly tributary streams.
4. Water erosion, particularly on older terrace soils, on sloping cultivated soils, and on windblown soils, when cover is removed or depleted by cultivation, overgrazing, or fire.
5. Soil blowing on dryfarmed areas of sand and loamy sand and along parts of the Salinas River.
6. Salt water intrusion at the mouth of the Salinas River at Castroville as well as an increasing salt content in irrigation water throughout the valley.

Most terrace soils have limited effective soil depth, and sands and loamy sands have low available water capacity. Urban development is rapidly encroaching on the most productive irrigated soils in the county.

Following are basic facts and assumptions considered in establishing the capability classification for Land Resource Area 14.

1. Irrigation water is available for all irrigable soils. Lack of precipitation or length of growing season does not influence placement of soils in the capability classification in this resource area. The soil is used at its highest production potential when irrigated. Potential evapotranspiration over a period of a year averages 25 to 27 inches along the coast and about 30 inches in the valleys. Reduced by a 32° F growing season, evapotranspiration is not changed along the coast but drops to 25 to 27 inches in the valleys.
2. Drainage can be improved by open ditches, tiling, pumping, and general lowering of the water table. The degree of limitation or the capability class depends more on the profile permeability than on the relative level of the water table.
3. Because a wide variety of cultivated crops can be grown in the county, soil limitations that narrow the choice of crops are not critical. Double or even triple cropping of row and truck crops is common in the lower Pajaro Valley and in the Salinas Valley inland as far as 50 miles from the coast.

Land Resource Area 15.—This land resource area includes most of the hills and mountains in Monterey County and some low-lying beaches, benches, and narrow valleys. It is made up of gently sloping to strongly sloping terraces, fans, and hills on both sides of the Pajaro, Salinas, Carmel, Lockwood, Hames, and Peach Tree Valleys. It includes the Gabilan and Diablo Ranges to the east and the Sierra de Salinas and Santa Lucia Ranges to the west. The elevation ranges from

200 to more than 2,500 feet, with peaks extending to more than 5,000 feet in the coastal mountains.

The soils of the Central California Coast Range are broadly characterized as:

1. Deep to shallow, rolling to very steep soils on hills.
2. Moderately deep to deep, calcareous clays and silty clay loams on rounded hills.
3. Deep to shallow, steep loams to sands on uplands.
4. Shallow and rocky soils on uplands.
5. Very deep recent alluvial soils in scattered, narrow valleys.

Some major factors limiting use of these soils are:

1. Low inherent fertility and low available water capacity in soils that are shallow over bedrock.
2. Low available water capacity and low fertility of sandy soils.
3. Steepness that prevents the use of farm machinery to improve vegetation. This applies to steep to very steep soils with cover such as chamise and manzanita and shallow soils.
4. Rock outcrops or sufficient content of rock fragments to increase runoff and decrease storage of water in the soils, including soils that have low fertility because of high magnesium-low calcium ratios (soils derived from serpentine).
5. Prolonged winter storms increase the hazard of erosion to soils that have subsoils of very slowly permeable clay and a low available water capacity.
6. The hazards of erosion, flooding, and deposition on shallow upland soils that have sparse cover.
7. A restricted root zone in terrace soils and low fertility and low available water capacity in sands and loamy sands limits their use for deep-rooted crops.

Following are basic facts and assumptions considered in establishing the capability classification for Land Resource Area 15.

1. Irrigation water is not available for any of the acreage in Land Resource Area 15. Precipitation and length of growing season influence the placement of soils in the capability classification. Fingers and isolated areas of irrigated land within Resource Area 15 will be treated as outlying areas of Resource Area 14. It is assumed that 20 inches of soil with an available water capacity of 3 inches is sufficient to grow forage plants.
2. Only 2 major cultivated dryfarmed crops, barley and wheat, are grown in Resource Area 15. Range forage is the other major crop. Minor acreages of dryland hay, fruit, and nuts are also grown but are not common in this area.

The following basic assumptions apply to both resource areas.

1. The average annual precipitation ranges from 10 inches east of San Ardo or at Soledad to 40 inches at Cone Peak. It is 25 inches in Carmel Valley. At Cone Peak, as much as 80 inches of rainfall has been recorded per year. Along the coast, the beneficial effect of the fog is equivalent to about 4 inches of rainfall. Some snow generally occurs annually at the higher elevations. Interior slopes, particularly in the southeastern part of the area, are in a "rain shadow" area.

   The climate is characterized by warm, dry summers, but it is often foggy in the northern part of the county, and by cool, moist winters. The average annual air temperature is about 55° F along the coast and about 60° in the inland valleys. High summer temperatures, about 100°, are infrequent and of short duration or do not occur at all except in the interior at lower elevations. Inland for short distances up the main valleys, minimum winter temperatures are seldom below 20° for more than a few hours. At the higher elevations, extreme lows have occurred.

   The frost-free season, when temperatures are 32° or more, is 300 to 350 days or more along the coast and 170 to 260 days in the interior at the lower elevations. Persistent winds occur during summer, particularly in and near the Salinas Valley foothills. Daily winds average 10 to 15 mph.
2. Damage from flooding has been reduced by water retention and flood control dams and levees. Additional flood control structures are anticipated. For this reason susceptibility to flooding is not a criterion for placing soils in capability units. Soils that are still subject to flooding are classified according to their permanent soil limitations, such as depth and texture.
3. A high level of management is practiced, one that is practical and within the ability of a majority of the farmers and ranchers. The complexity and intensity of feasible practices are consistent with broad economic opportunities and standards of the area. The combinations of necessary practices vary with soil and crop needs but are adequate to protect and maintain the soil resource.

Management by capability units

Use of crop residue, minimum tillage, cover crops, and fertilization are common management practices in Monterey County.

Disking or plowing under crop residues provides organic matter and reduces soil loss from erosion. The addition of organic matter to the soil increases fertility, aeration, and moisture penetration and maintains or improves soil structure.

Minimum tillage helps to maintain soil structure and reduce compaction, thus influencing the movement of air and water through the soil. Chemical weed control reduces the amount of tillage needed. Proper timing of tillage operations is important. All tillage should be done when moisture conditions are such that compaction can be kept to a minimum. Well designed access

roads that minimize travel over the soil help in reducing compaction.

Cover crops are effective in protecting and improving cropland and orchards during winter. Trieste mustard, peas, barley, and volunteer forbs and grasses provide protection against water erosion and soil blowing and improve water intake, thus reducing runoff. Cover crops utilized as green manure also add organic matter to the soil.

Fertilization is generally needed to maintain or increase soil productivity. The kinds and amounts of fertilizer vary according to the crop. Nearly all crops except forage legumes respond to nitrogen. Legumes, truck crops, and field crops respond to phosphorus. Some crops show zinc and other microelement deficiencies and respond to their application.

In the following pages the capability units in Monterey County are described, and suggestions for the use and management of the soils are given. The names of the soil series represented are mentioned in the description of each unit, but this does not mean that all soils of a given series are in the unit. The capability unit designations for each soil in the area are given in the "Guide to Mapping Units."

CAPABILITY UNIT I(14)

The soils in this unit are Chualar, Docas, Lockwood, Mocho, Pico, Salinas, and Sorrento soils. They are well drained soils that formed in mixed alluvium on flood plains, alluvial fans, terraces, and river benches. The surface layer is fine sandy loam, loam, silt loam, and silty clay loam, and the subsoil or substratum are similar in texture. Slopes are 0 to 2 percent. The mean annual precipitation is 10 to 35 inches, and the frost-free season is 200 to 350 days. Permeability is moderately rapid to moderately slow. Runoff is very slow to slow, and the erosion hazard is minimal to slight. Roots can penetrate to a depth of more than 60 inches, and the available water capacity is 7.5 to 13 inches.

The soils are suited to and used for all of the adapted crops in Monterey County.

These soils have very few limitations when farmed intensively. They require only good management practices to remain highly productive. Any method of irrigation can be used, depending on the crop and personal preference.

CAPABILITY UNIT IIe-1(14)

The soils in this unit are Chualar, Docas, Elder, Elkhorn, Garey, Greenfield, Lockwood, Mocho, Salinas, and Sorrento soils. They are well drained soils that formed in mixed alluvium on fans, terraces, flood or alluvial plains, and river benches and in small valleys. The surface layer is fine sandy loam, very fine sandy loam, loam, silt loam, clay loam, and silty clay loam, and the subsoil or substratum are similar in texture. Slopes are 2 to 9 percent. The mean annual precipitation is 10 to 35 inches, and the frost-free season is 200 to 350 days. Permeability is moderately rapid or moderately slow. Runoff is slow to medium, and the erosion hazard is slight to moderate. Roots can penetrate to a depth of 40 to 60 inches or more, and the available water capacity is 5 to 13 inches.

These soils are well suited to all of the field, forage, orchard, vineyard, row, and truck crops grown in Monterey County.

Irrigation can be by either the sprinkler or the furrow method. Furrows must be laid out across the slope to reduce the erosion hazard. Winter cover crops help to reduce the erosion hazard in orchard and vineyards.

CAPABILITY UNIT IIe-3(14)

The soils in this unit are Danville and Rincon soils. They are well drained soils that formed in mixed alluvium on alluvial fans and terraces and in small valleys. The surface layer is sandy clay loam or clay loam, and the subsoil is clay. Slopes are 2 to 9 percent. The mean annual precipitation is 10 to 20 inches, and the frost-free season is about 250 days. Permeability is slow. Runoff is slow to medium, and the erosion hazard is slight to moderate. Roots can penetrate to a depth of more than 60 inches, and the available water capacity is 8 to 11 inches.

These soils are suited to most of the field, forage, orchard, row, and truck crops grown in Monterey County.

These soils are suited to irrigation by either the sprinkler or the furrow method. All tillage including in furrows should be across the slope to reduce the erosion hazard. Chiseling or subsoiling to a depth of about 18 to 24 inches every 3 or 4 years improves root and water penetration of the subsoil. Land grading or leveling may be needed to smooth the local microtopography, but deep cuts that would expose the clay subsoil should be avoided.

CAPABILITY UNIT IIe-4(14)

The soils in this unit are Arbuckle, Arroyo Seco, and Lockwood soils. They are well drained soils that formed in alluvium that was derived from a variety of parent materials. They are on alluvial plains and fans and on terraces. The surface layer is gravelly loam or shaly loam, and the subsoil or substratum is gravelly sandy loam, gravelly clay loam, or shaly clay loam. Slopes are 2 to 9 percent. The mean annual precipitation is 12 to 35 inches, and the frost-free season is 200 to 260 days. Permeability is moderately rapid to moderately slow. Runoff is medium to slow, and the erosion hazard is slight to moderate. Roots can penetrate to a depth of 60 inches or more, and the available water capacity is 5 to 8 inches.

These soils are suited to most of the field, forage, orchard, vineyard, row, and truck crops grown in the county.

The gravel and shale fragments in the surface layer of these soils limit the type of equipment that can be used in cultivation. They also reduce the available water capacity, making it necessary to irrigate these soils more frequently and with smaller amounts of water. Both furrows and sprinklers are suitable methods of irrigation, but sprinklers are more suitable because of the gravel content of the soils. All tillage should be across the slope to reduce the erosion hazard. In land leveling or grading, deep cuts should be avoided.

CAPABILITY UNIT IIe-5(14)

Cropley silty clay, 2 to 9 percent slopes, is the only soil in this unit. It is a well drained soil that formed in mixed alluvium on terraces, flood plains, and alluvial

fans and in basins. It is silty clay throughout the profile. The mean annual precipitation is 12 to 18 inches, and the frost-free season is about 250 days. Permeability is slow. Runoff is slow to medium, and the erosion hazard is slight to moderate. Roots can penetrate to a depth of 60 inches or more, and the available water capacity is 8 to 10 inches.

This soil is suited to most of the field, forage, orchard, row, and truck crops grown in Monterey County.

This soil is best suited to irrigation by sprinklers. Irrigation water must be applied in infrequent, slow applications of long duration, because the infiltration rate is slow and the soil is slowly permeable. This soil should not be worked when too dry or too wet because it forms large clods or puddles and seals over. Land smoothing or leveling generally can be done without adverse effects.

CAPABILITY UNIT IIw-2(14)

The soils in this unit are Lockwood and Pacheco soils. They are somewhat poorly drained or they have a perched water table that results from altered drainage in the moderately slowly permeable underlying material. These soils formed in alluvium that was derived from siliceous shale or sedimentary rocks. They are on flood plains and in swales on terraces. They are shaly loam or clay loam throughout the profile. Slopes are less than 2 percent. The average annual precipitation is 12 to 35 inches, and the frost-free season is 200 to 350 days. Permeability is moderately slow. Runoff is slow, very slow, or ponded, and the erosion hazard is minimal to slight. A water table is at a depth of 20 to 48 inches, and the available water capacity to that depth is 6 to 12 inches.

These soils are suited to most of the field, forage, row, and truck crops grown in Monterey County. They are less suited to deep rooted crops because of the high water table.

Irrigation can be by the sprinkler or the furrow method. It should be carefully controlled to prevent overirrigation, which causes the water table to rise. Where adequate outlets are available, tile drains or open ditches help to keep the water table below the root zone. Where outlets are not available, sump pumps can also be used to dispose of excess ground water. Provisions also must be made for the disposal of excess surface or runoff water.

CAPABILITY UNIT IIw-5(14)

Clear Lake clay, moderately wet, is the only soil in this unit. It formed in alluvium that was derived from sedimentary rock in basins. The surface layer is clay, and the substratum is silty clay loam. Slopes are less than 2 percent. The mean annual precipitation is 12 to 25 inches, and the frost-free season is about 270 days. Permeability is slow. Runoff is very slow, and the erosion hazard is minimal. Because the soil is only partly drained, a water table is at a depth of 36 to 60 inches. The available water capacity is 8 to 10 inches.

This soil is suited to such important crops as artichokes, broccoli, carrots, cauliflower, celery, lettuce, beans, sugar beets, and peas.

Seedbed preparation is difficult because of the clay texture. The soil should not be worked when too dry or too wet because it forms large clods or puddles and seals over. Irrigation water should be applied in infrequent, slow applications of long duration. This soil is suited to both sprinkler and furrow irrigation. Tile drains or open ditches help to keep the water table below the root zone. Leaching of accumulated salts is needed in some places.

CAPABILITY UNIT IIs-3(14)

The soils in this unit are Danville and Rincon soils. They are well drained soils that formed in mixed alluvium on alluvial fans and terraces and in valleys. The surface layer is sandy clay loam or clay loam, and the subsoil is clay. Slopes are 0 to 2 percent. The mean annual precipitation is 19 to 20 inches, and the frost-free season is about 250 days. Permeability is slow. Runoff is slow, and the erosion hazard is minimal to slight. Roots can penetrate to a depth of more than 60 inches, and the available water capacity is 8 to 11 inches.

These soils are suited to most of the field, forage, row, and truck crops grown in the county. They are less suited to orchard crops because of the slowly permeable clay subsoil.

These soils can be irrigated by either the sprinkler or the furrow method. Chiseling or subsoiling to a depth of 18 to 24 inches every 3 or 4 years helps to improve root and water penetration in the subsoil. If these soils are leveled, deep cuts that expose the clay subsoil should be avoided. Adequate drainage is needed to avoid waterlogging and a temporarily perched water table.

CAPABILITY UNIT IIs-4(14)

The soils in this unit are Arroyo Seco, Elder, Hanford, Lockwood, and Metz soils. They are well drained and somewhat excessively drained soils that formed in mixed alluvium on alluvial fans and plains, on terraces, and in small valleys. The surface layer is sandy loam, fine sandy loam, loam, gravelly sandy loam, or shaly loam. The subsoil or substratum ranges from shaly clay loam to sand, gravel, and cobblestones. Slopes are dominantly 0 to 2 percent, but range to 5 percent. The mean annual precipitation is 10 to 35 inches, and the frost-free season is 210 to 350 days. Permeability is moderately slow to rapid. Runoff is slow, and the erosion hazard is slight. Roots can penetrate to a depth of 40 to 60 inches or more, and the available water capacity is dominantly 5 to 9 inches.

These soils are well suited to most of the crops grown in the area.

Because of the relatively low available water capacity, these soils should be irrigated frequently with a small amount of water at each irrigation. Windbreaks help to protect crops from wind damage on the sandier soils. On gravelly and shaly soils, the type of tillage equipment that can be used is restricted.

CAPABILITY UNIT IIs-5(14)

Cropley silty clay, 0 to 2 percent slopes, is the only soil in this unit. It is a well drained soil that formed in mixed alluvium on terraces, on alluvial fans and plains, and in basins. It is silty clay throughout the profile. Slopes are 1 to 2 percent. The mean annual

precipitation is 12 to 18 inches, and the frost-free season is about 250 days. Permeability is slow. Runoff is slow, and the erosion hazard is minimal to slight. Roots can penetrate to a depth of 60 inches or more, and the available water capacity is 8 to 10 inches.

This soil is suited to most of the field, forage, orchard, row, and truck crops grown in the area.

Seedbed preparation is difficult because of the silty clay texture. This soil should not be worked when too dry or too wet because it forms large clods or puddles and seals over. The soil is suited to irrigation by the sprinkler or the furrow method. Irrigation water must be applied in infrequent, slow applications of long duration because the infiltration rate is slow and the soil is slowly permeable.

CAPABILITY UNIT IIIe-1(14)

The soils in this unit are Elkhorn and Greenfield soils. They are well drained soils that formed in mixed alluvium on terraces, alluvial fans, and dunelike hills. The surface layer is fine sandy loam, and the subsoil is sandy clay loam or heavy sandy loam. Slopes are 9 to 15 percent. The mean annual precipitation is 10 to 20 inches, and the average frost-free season is about 250 to 270 days. Permeability is moderately rapid to moderately slow. Runoff is medium, and the erosion hazard is moderate. Roots can penetrate to a depth of 60 inches or more, and the available water capacity is 6 to 9 inches.

These soils are suited to most of the field, forage, orchard, vineyard, row, and truck crops grown in the county.

All tillage must be across the slope or on the contour. Cover crops are needed in orchards and vineyards. Where slopes are long, diversions are needed to carry runoff to suitable outlets. Sprinklers are the best method of irrigation.

CAPABILITY UNIT IIIe-1(15)

The soils of this unit are Elder, Garey, Linne, Lockwood, Nacimiento, Pfeiffer, Salinas, Snelling, and Sorrento soils. They are well drained soils that formed in mixed alluvium on terraces, fans, and plains or in small valleys; in residuum that was derived from granitic rocks; or in material that was derived from sandstone and shale. The surface layer ranges from coarse sandy loam to silty clay loam, and the subsoil or substratum ranges from sandy loam to clay loam. A few areas are gravelly. Slopes are 2 to 15 percent. The mean annual precipitation is 10 to 55 inches, and the frost-free season is 200 to 350 days. Permeability is moderately rapid to moderately slow. Runoff is slow to medium, and the erosion hazard is slight to moderate. The soils that formed in alluvium are more than 60 inches deep and have an available water capacity of 6 to 13 inches. The soils on uplands are 20 to 60 inches deep and have an available water capacity of 5 to 8 inches.

These soils are suited to dryland barley, wheat, and forage crops.

Where runoff from the surrounding hills moves across these soils, diversions are needed to convey the water to safe outlets. All tillage and seeding should be across the slope to reduce runoff and minimize the erosion hazard.

CAPABILITY UNIT IIIe-3(14)

The soils in this unit are Antioch, Gloria, and Rincon soils and the Elkhorn variant. They are well drained soils that formed in mixed alluvium and windlaid sands on old alluvial fans and terraces. The surface layer is sandy loam and clay loam, and the subsoil is clay or clay loam. Slopes are 2 to 15 percent. The mean annual precipitation is 12 to 20 inches, and the average frost-free season is 250 to 270 days. Permeability is moderately slow to very slow. Runoff is slow to medium, and the erosion hazard is slight to moderate. Some roots can only penetrate 18 to 40 inches to the very slowly permeable clay subsoil or to weakly consolidated sediments, but grasses can generally penetrate to a depth of more than 60 inches. The available water capacity is 3 to 6 inches to the shallow rooting depth and 9 to 11 inches to the deeper rooting depth.

These soils are best suited to shallow rooted field, forage, row, and truck crops. Such specialty crops as strawberries or flowers are also grown in some areas.

Low spots or swales commonly remain wet for long periods after rain or excess irrigation. Irrigation water must be applied very carefully to avoid waterlogging. All tillage should be across the slope or on the contour to slow runoff and reduce the erosion hazard. On long slopes, diversions may be needed to carry runoff to adequate outlets.

CAPABILITY UNIT IIIe-3(15)

The soils in this unit are Dibble and Los Osos soils. They are well drained soils that formed in material that was derived from sandstone and shale on uplands. The surface layer is loam, silt loam, and clay loam, and the subsoil is heavy clay loam or clay. Slopes are 2 to 15 percent. The mean annual precipitation is 12 to 35 inches, and the frost-free season is 150 to 250 days. Permeability is slow. Runoff is medium, and the erosion hazard is moderate. Roots can penetrate to a depth of 24 to 40 inches and are limited by the parent rock. The available water capacity is 4 to 7.5 inches.

These soils are suited to barley, wheat, and dryland forage crops, but most areas are used for range.

Tillage and seeding must be across the slope or on the contour. On long, smooth slopes, diversions are needed to transport runoff to safe outlets. Keeping a protective plant cover or stubble mulch on the surface during winter protects the soil from erosion.

CAPABILITY UNIT IIIe-4(14)

The soils in this unit are Arroyo Seco and Lockwood soils. They are well drained soils that formed in material that was derived from mixed rock on alluvial fans, plains, and terraces. The surface layer is gravelly sandy loam or shaly loam, and the subsoil or substratum is very gravelly coarse sandy loam or shaly clay loam. Slopes are 2 to 15 percent. The mean annual precipitation is 2 to 35 inches, and the frost-free season is 150 to 350 days. Permeability is moderately rapid to moderately slow. Runoff is slow to medium, and the erosion hazard is slight to moderate. Roots can penetrate to a depth of more than 60 inches, and the available water capacity is 4 to 8 inches.

These soils are suited to most of the field, forage, or-

chard, vineyard, row, and truck crops grown in the county.

Because of the limited available water capacity of these soils, irrigation water should be applied frequently in small amounts. Water is best applied by sprinklers. The gravelly surface layer limits the type of tillage that can be used on these soils. All tillage and seeding should be either across the slope or on the contour to slow runoff and reduce the erosion hazard.

CAPABILITY UNIT IIIe-4(15)

The soils in this unit are Arbuckle, Arroyo Seco, and Lockwood soils. They are well drained soils that formed in mixed alluvium on terraces, alluvial fans, and plains. The surface layer is gravelly sandy loam, gravelly loam, or shaly loam, and the subsoil or substratum is gravelly clay loam, shaly clay loam, or very gravelly coarse sandy loam. Slopes are 2 to 15 percent. The mean annual precipitation is 12 to 35 inches, and the frost-free season is 150 to 350 days. Permeability is moderately slow to moderately rapid. Runoff is slow to medium, and the erosion hazard is slight to moderate. Roots can penetrate to a depth of 60 inches or more, and the available water capacity is 4 to 8 inches.

These soils are suited to barley, wheat, and dryland forage crops and dryland pasture, and they are used for these crops.

These soils should be tilled and seeded across the slope or on the contour to help reduce the erosion hazard. On long slopes, diversions are needed to transport runoff to safe outlets. A protective winter cover, such as stubble mulch, also helps to reduce the erosion hazard. The gravel content in these soils makes tillage more difficult and reduces the amount of moisture available to dryland plants.

CAPABILITY UNIT IIIe-5(15)

The soils in this unit are Alo, Ayar, Cropley, Diablo, and Parkfield soils. They are well drained soils that formed in mixed alluvium or in weakly cemented sediments on terraces and alluvial fans or plains, or they formed in material that was derived from sandstone and shale on uplands. They are silty clay or clay throughout the profile. Slopes are 2 to 15 percent. The mean annual precipitation is 10 to 25 inches, and the frost-free season is 150 to 250 days. Permeability is slow. Runoff is medium, and the erosion hazard is slight to moderate. The soils either are 24 to 60 inches deep to sandstone, shale, or weakly cemented sediments or are more than 60 inches deep. The available water capacity is 3 to 12 inches.

These soils are suited to dryland barley, wheat, and forage crops and dryland pasture and range, and they are used for these crops. If irrigation water is available, they are also suited to a variety of row, truck, and field crops.

These soils should not be worked when too dry or too wet because they form large clods or puddle and seal over. Tillage and seeding should be across the slope or on the contour to minimize soil losses. Diversions are needed to carry runoff to protected outlets. Stubble mulches or crop residues returned to the soil help to increase infiltration rates and reduce the erosion hazard.

CAPABILITY UNIT IIIw-2(15)

Pacheco silty clay loam, occasionally flooded, is the only soil in this unit. It is a somewhat poorly drained soil that formed in alluvium that was derived from sedimentary rock on flood plains. The surface layer is silty clay loam, and the substratum is stratified. Slopes are less than 2 percent. The mean annual precipitation is 15 to 20 inches, and the frost-free season is 250 to 300 days. Permeability is moderately slow. Runoff is slow, and the erosion hazard is slight. The soil is subject to occasional flooding. Roots can penetrate to a depth of 60 inches or more, and the water table has been lowered to below 60 inches. The available water capacity is 10 to 12 inches.

This soil is used for dryland grain, hay, and pasture. If irrigated and protected from flooding, it is suited to a wide variety of field, row, and truck crops.

This soil must be protected from flooding by constructing dikes or levees along adjoining streams and by diverting runoff from the surrounding hills into adequately protected outlets. The timing of fieldwork depends on the existing flood conditions.

CAPABILITY UNIT IIIw-4(14)

Tangair fine sand, 2 to 9 percent slopes, is the only soil in this unit. It is a somewhat poorly drained soil that formed in mixed sands on wind-modified terraces. The surface layer is fine sand, and the substratum is fine sandy loam. The mean annual precipitation is 17 or 18 inches, and the frost-free season is 300 days. Permeability is rapid. Runoff is slow, the water erosion hazard is slight, and the soil blowing hazard is moderate. Roots can penetrate to a depth of more than 60 inches, and the available water capacity is 3.5 to 4.5 inches.

This soil is used for trees and for urban development and golf courses. Very little, if any, acreage is left for farming.

Subsurface drainage systems are required to keep the water table from rising in this soil. Vegetative cover or mulch is needed to reduce the soil blowing hazard. Irrigation water should be applied fairly frequently in small amounts to avoid leaching plant nutrients from the soil and to keep the water table below a depth of 5 feet.

CAPABILITY UNIT IIIw-5(14)

Clear Lake clay is the only soil in this unit. It is a poorly drained soil that formed in alluvium on flood plains and in basins. Slopes are less than 2 percent. The mean annual precipitation is 12 to 25 inches, and the frost-free season is about 270 days. Permeability is slow. Runoff is very slow, and the hazard of erosion is minimal. A water table at a depth of 18 to 36 inches restricts the root growth of some plants. The available water capacity to that depth is 6 to 9 inches.

This soil is suited to most of the row and truck crops grown in Monterey County. Because of the water table, it is not suited to deep rooted crops.

Where suitable outlets are available, tile drains or open ditches help to keep the water table below the root zone. Where outlets are not available, sumps and pumps may be needed in addition to tile drains to keep the water table below the root zone. Irrigation water

should be applied slowly and at long intervals because the intake rate is slow and the soil is slowly permeable. The soil should not be plowed when too dry or too wet. Land leveling or smoothing may be needed for more uniform distribution of irrigation water.

CAPABILITY UNIT IIIs-3(14)

The soils in this unit are Antioch and Placentia soils. They are well drained and moderately well drained soils that formed in material that was derived from mixed sources on terraces and older alluvial fans. The surface layer is very fine sandy loam or sandy loam, and the subsoil is clay. Slopes are 0 to 2 percent. The mean annual precipitation is 12 to 20 inches, and the frost-free season is about 250 days. Permeability is very slow. Runoff is slow to very slow, and the erosion hazard is minimal to slight. Roots can penetrate to a depth of 18 to 36 inches and are limited by the clay subsoil. The available water capacity is 3.5 to 5 inches, and a very small amount of water is available from the clay subsoil.

These soils are suited to most of the field, row, and truck crops grown in Monterey County, and they are used for these crops.

Because of the shallow rooting depth, deep cuts must be avoided in land leveling or smoothing. Irrigation water should be applied frequently in small amounts to prevent the formation of a perched water table. Sprinklers are the best method of irrigation, but water can be applied by furrows under intensive management. Subsoiling or ripping every 3 or 4 years helps to open the clay subsoil and improve water and root penetration. Runoff from surrounding soils should be diverted to protected outlets to prevent waterlogging.

CAPABILITY UNIT IIIs-4(14)

The soils in this unit are Arroyo Seco, Gorgonio, and Metz soils. They are well drained and somewhat excessively drained soils that formed in mixed alluvium on alluvial fans and plains and in mountain valleys. They are gravelly sandy loam, sandy loam, and loamy sand and typically are stratified or have a gravelly or very gravelly substratum. Slopes are 0 to 5 percent. The mean annual precipitation is 12 to 30 inches, and the frost-free season is 210 to 280 days. Permeability is rapid to moderate, depending upon the degree of stratification. Runoff is slow, and the erosion hazard is slight. Roots can penetrate to a depth of more than 60 inches, and the available water capacity is 3.5 to 6 inches.

These soils are suited to most of the field, forage, orchard, vineyard, row, and truck crops grown in the county, and they are used for these crops.

Because of the low available water capacity, these soils need light, frequent applications of irrigation water. Sprinklers are best suited for applying irrigation water.

CAPABILITY UNIT IIIs-4(15)

The soils in this unit are Gorgonio, Hanford, and Lockwood soils. They are well drained and somewhat excessively drained soils that formed in mixed alluvium on alluvial fans, terraces, and flood plains and in mountain valleys. The surface layer is sandy loam, gravelly sandy loam, and shaly loam. The subsoil or substratum is fine gravelly loamy sand, gravelly loamy coarse sand, or shaly clay loam. Slopes are 0 to 5 percent. The mean annual precipitation is 10 to 35 inches, and the frost-free season is 150 to 350 days. Permeability is mostly rapid or moderately rapid. Runoff is slow, and the erosion hazard is slight. Roots can penetrate to a depth of more than 60 inches, and the available water capacity is 4 to 10 inches.

These soils are suited to dryland barley, wheat, and forage crops and dryland pasture, and they are used for these crops.

Crop residues or stubble mulches returned to the soil improve the water intake rate. Tillage is restricted on the gravelly and shaly soils. These soils should be farmed only every other year.

CAPABILITY UNIT IIIc-1(15)

The soils in this unit are Chualar, Docas, Lockwood, Mocho, Pico, and Sorrento soils. They are well drained soils that formed in alluvium that was derived from mixed sources on flood plains, alluvial fans, terraces, and river benches. The surface layer and subsoil or substratum are fine sandy loam, loam, silt loam, and silty clay loam. Slopes are 0 to 2 percent. The mean annual precipitation is 10 to 35 inches, and the frost-free season is 200 to 350 days. Permeability is moderately rapid to moderately slow. Runoff is very slow or slow, and the erosion hazard is minimal to slight. Roots can penetrate to a depth of 60 inches or more, and the available water capacity is 7.5 to 13 inches.

These soils are suited to dryland grain, hay, and pasture, and they are used for these crops.

There are very few limitations to farming these soils. Under good management, they remain productive.

CAPABILITY UNIT IVe-1(15)

The soils in this unit are Chamise, Garey, Gazos, Gilroy, Greenfield, Linne, McCoy, Nacimiento, Pfieffer, Shedd, Sheridan, Snelling, and Vista soils and the slowly permeable Diablo clay mapped in complexes with Linne soils. The soils in this unit are well drained. They formed in alluvium that was derived from mixed sources on alluvial fans and terraces or in residuum that was derived from sandstone, shale, granite, and metamorphosed igneous rocks on uplands and hills. The surface layer and subsoil or substratum are coarse sandy loam to silty clay loam and are shaly or gravelly in places. Slopes are dominantly 9 to 30 percent, but are as gentle as 5 percent in some places. The mean annual precipitation is 10 to 55 inches, and the frost-free season is 170 to 280 days. Permeability is moderately rapid to moderately slow. Runoff is medium to rapid, and the erosion hazard is mostly moderate to high. Roots can penetrate to a depth of 20 inches or more, and the available water capacity is 3 to 10 inches.

These soils are suited to dryland pasture and range and to limited growing of dryland barley or wheat.

All tillage must be on the contour to slow runoff and reduce the erosion hazard. In some fields, diversions are needed to carry runoff to safe outlets. Returning mulches or crop residues to the soil helps to slow runoff and reduce the erosion hazard. For maximum pro-

tection against erosion, these soils should not be tilled more than 1 year out of 3 or 4. Grasses and legumes grown for hay and pasture should be seeded during the interim period to provide ground cover.

CAPABILITY UNIT IVe-3(14)

The soils in this unit are Antioch, Gloria, Narlon, Placentia, Rincon, and Santa Ynez soils and the Elkhorn variant. They are somewhat poorly drained to well drained soils that formed in mixed alluvium on old fans and terraces. The surface layer is loamy fine sand, sandy loam, fine sandy loam, very fine sandy loam, and clay loam. The subsoil is clay or clay loam. Slopes are 2 to 30 percent. The mean annual precipitation is 12 to 25 inches, and the frost-free season is about 250 days. Permeability is moderately slow to very slow. Runoff is generally slow to rapid, but water ponds in swales on some soils. The erosion hazard is moderate to high. Roots can penetrate to a depth of 10 to 60 inches and are restricted by the clay subsoil or underlying sediments. The available water capacity is 2 to 11 inches.

These soils are suited to irrigated hay and pasture, and they are used for these crops.

Tillage should be on the contour and kept to a minimum. Irrigation water should be applied by sprinklers and must be applied very carefully to avoid excess runoff and waterlogging, especially in swales. Land leveling is generally not practical on these soils because of the shallow depth to the clay subsoil or because of slope.

CAPABILITY UNIT IVe-3(15)

The soils in this unit are Dibble, Gloria, Los Osos, Placentia, and Santa Ynez soils. They are well drained and moderately well drained soils that formed in alluvium that was derived from mixed sources on older fans and terraces or in material that was derived from sandstone and shale on uplands. The surface layer is sandy loam, fine sandy loam, silt loam, or clay loam, and the subsoil is clay. Slopes are 2 to 30 percent. The mean annual precipitation is 10 to 35 inches, and the frost-free season is 150 to 250 days. Permeability is slow or very slow. Runoff is slow to medium, and the erosion hazard is slight to moderate. Roots can penetrate to a depth of 10 to 40 inches, and the available water capacity is 2 to 8 inches.

These soils are suited to range, dryland pasture, dryland hay, and dryland grain, and they are used for these crops.

All tillage must be on the contour and kept to a minimum. Small grains should be grown only once every 2 years. Returning stubble mulches or crop residues to the soil helps to slow runoff, increase the infiltration rate, and reduce the soil blowing hazard.

CAPABILITY UNIT IVe-4(14)

The soils in this unit are Metz, Oceano, and Tujunga soils. They are somewhat excessively drained and excessively drained soils that formed in mixed alluvium on flood plains and alluvial fans or on wind-laid sand dunes that have been stabilized. The surface layer ranges from sand to very fine sandy loam. The substratum is typically highly stratified and has silt and clay lenses in some areas. Slopes are 0 to 15 percent. The mean annual precipitation is 10 to 18 inches, and the frost-free season is 200 to 280 days. Permeability is moderate to rapid, depending on the degree of stratification. Runoff is very slow to medium, and the erosion hazard is slight or moderate. Roots can penetrate to a depth of more than 60 inches, and the available water capacity is 2.5 to 6 inches.

These soils are suited to most of the field, forage, orchard, vineyard, row, and truck crops grown in Monterey County.

These soils are best suited to irrigation by sprinklers. Water must be applied in small amounts at frequent intervals to conserve water. Windbreaks reduce the hazard of soil blowing.

CAPABILITY UNIT IVe-4(15)

The soils in this unit are Arnold, Santa Lucia, and Tujunga soils. They are well drained to excessively drained. The Arnold soils formed in material that was derived from soft sandstone on uplands; the Santa Lucia soils formed in material that was derived from Monterey shale on uplands; and the Tujunga soils formed in mixed sediments on flood plains and alluvial fans. The surface layer is fine sand, loamy sand, or shaly clay loam. Slopes are 0 to 30 percent. The mean annual precipitation is 12 to 30 inches, and the frost-free season is 200 to 230 days. Permeability is rapid to moderate. Runoff is very slow to medium, and the erosion hazard is slight to moderate. Roots can penetrate to a depth of 20 to 60 inches or more, and the available water capacity is 2.5 to 6 inches.

These soils are suited to dryland hay and pasture and, marginally, to dryland grain. They are also used for range.

Because of the low available water capacity of these soils, grain should be grown only 1 year out of 3 or 4. Cover crops of grass and legume hay and pasture should be grown between grain crops to protect the soils from excessive erosion losses. Tillage must be kept to a minimum and should be on the contour on steeper slopes.

CAPABILITY UNIT IVe-5(15)

The soils in this unit are Alo, Ayar, Climara, and Diablo soils. They are well drained clays or silty clays that formed in material that was derived from sandstone, shale, and serpentine on uplands. Slopes are 15 to 30 percent. The mean annual precipitation is 10 to 25 inches, and the frost-free season is 150 to 250 days. Permeability is slow. Runoff is rapid, and the erosion hazard is moderate to high. Roots can penetrate to a depth of 30 to 60 inches, and the available water capacity is 5 to 12 inches.

These soils are suited to dryland grain, hay and pasture, and range, and they are used for these crops.

All tillage and seeding should be on the contour. These soils should not be tilled when too dry or too wet because they form large clods or puddle and seal over. Returning crop residues or stubble mulches to the soil helps to reduce the erosion hazard.

CAPABILITY UNIT IVw-4(15)

Tangair fine sand, 2 to 9 percent slopes, and Aquic Xerofluvents are in this unit. They are somewhat poorly drained. The Tangair soils formed in wind-

modified material on terraces, and the Aquic Xerofluvents formed in stratified material on flood plains. The surface layer is fine sand, and the substratum is fine sandy loam. The mean annual precipitation is 17 or 18 inches, and the frost-free season is about 300 days. Permeability is rapid in Tangair fine sand and variable in Aquic Xerofluvents. Runoff is slow. The water erosion hazard is slight to moderate, and the soil blowing hazard is moderate. Roots can penetrate to a depth of 60 inches or more. The available water capacity is 3.5 to 4.6 inches in Tangair fine sand and variable in Aquic Xerofluvents.

The Tangair soil is used mainly for woodlots and nonfarm purposes. Aquic Xerofluvents are used for pasture.

The Tangair soil should be protected from soil blowing by a vegetative cover. Aquic Xerofluvents should be protected from flooding. When protected, they are well suited to row crops.

CAPABILITY UNIT VIe-1(15)

The soils in this unit are Alo, Arbuckle, Arnold, Ayar, Baywood, Chamise, Climara, Diablo, Dibble, Garey, Gaviota, Gazos, Haire, Linne, Los Gatos, Los Osos, McCoy, Nacimiento, Oceano, Parkfield, Pinnacles, Pinnacles variant, Placentia, San Andreas, San Benito, Santa Ynez, Shedd, Sheridan, and Vista soils. The land type Xerorthents, loamy, is also in this unit. The soils are moderately well drained to excessively drained. They formed in alluvium that was derived from mixed sources on alluvial fans and terraces and in material that was derived from a wide variety of rocks on sand dunes, hills, and uplands. They range from sand to clay. Slopes are 2 to 50 percent. The mean annual precipitation is 10 to 55 inches, and the frost-free season is 150 to 300 days. Permeability is rapid to very slow. Runoff is slow to rapid, and the erosion hazard is slight to high. Roots can penetrate to a depth of 10 inches or more, and the available water capacity is 2 to 12 inches.

These soils are used for range and, in very limited areas, for woodland.

The soils should be protected from overgrazing and need good range management. For their use as range, see the section "Range." These soils respond favorably to seeding adapted plants and to applications of fertilizers.

CAPABILITY UNIT VIw-1(14)

Alviso silty clay loam, drained, is the only soil in this unit. It formed in mixed alluvium in basins and on tidal flats. This is a very poorly drained soil, but it has been partly drained and the water table has been lowered to a depth of 12 to 25 inches. The surface layer is silty clay loam, and the substratum is stratified silty clay to very fine sand. The mean annual precipitation is 12 to 21 inches, and the frost-free season is about 330 days. Permeability is slow. Water ponds on the surface or runs off very slowly. The hazard of erosion is minimal. Roots can penetrate to a depth of 60 inches or more, but some roots sensitive to water penetrate only to a depth of 12 to 24 inches. The available water capacity to that depth is about 3.5 to 7.5 inches. The soil has moderate amounts of salts and alkali.

This soil is suited to forage crops and to broccoli, cauliflower, celery, and lettuce, and it is used for these crops.

Irrigation water must be applied carefully to avoid building up the water table. Because the water table is near the surface, salts and alkali are difficult to leach. Tile drains aid in reducing the amounts of salt and alkali and in keeping the water table below the rooting depth.

CAPABILITY UNIT VIw-1(15)

This unit consists of Rindge muck and Psamments and Fluvents, occasionally flooded. They are very poorly drained or excessively drained, and the latter are subject to occasional overflow. These soils formed in organic material in sloughs and drainage channels or on sandy flood plains. They are muck or sands, gravel, and cobblestones. Slopes are mostly less than 2 percent. The mean annual precipitation is 14 to 20 inches, and the frost-free season is 250 to 300 days. Permeability is rapid to very rapid. Water ponds on the surface or runs off very slowly. The erosion hazard is minimal to moderate. Roots can penetrate to a depth of more than 60 inches, but Rindge soils have a water table at a depth of 10 to 30 inches. The available water capacity is 2 to 3 inches for Psamments and Fluvents and 15 to 18 inches or more for Rindge muck.

These soils are used for range and dryland pasture. If drained or protected from flooding, they are suited to the row and truck crops grown in the county.

These soils should be protected from flooding by a system of dikes, levees, or diversions. Tile drains or open ditches, or both, help to lower the water table and to keep it below the root zone. If suitable outlets are not available, sumps and pumps are required to lower the water table. If not drained or protected from flooding, these soils grow forage for livestock and wildlife.

CAPABILITY UNIT VIIe-1(15)

The soils in this unit are Alo, Arnold, Cieneba, Climara, Garey, Gaviota, Gilroy, Gloria, Junipero, Linne, Lopez, Los Gatos, Los Osos, McCoy, McMullin, Millsholm, Montara, Nacimiento, Narlon, Pinnacles, Plaskett, San Andreas, San Benito, Santa Lucia, San Timoteo, Shedd, Sheridan, Sur, and Vista soils. Also in this unit are Xererts-Xerolls complex, Xerorthents, sandy, and Xerorthents, dissected. The soils are somewhat poorly drained to excessively drained. They formed in alluvium that was derived from mixed sources on old alluvial fans and terraces and in material that was derived from a wide variety of rocks on sand dunes, hills, and uplands. They range from sand to clay. Slopes are 15 to 75 percent. The mean annual precipitation is 10 to 80 inches, and the frost-free season is 150 to 350 days. Permeability is mostly rapid to very slow. Runoff is medium to very rapid, and the erosion hazard is high to very high. Roots can penetrate to a depth of 5 to 60 inches, and the available water capacity is 1 to 8 inches.

These soils are suited to range and some limited woodland.

Good range management is needed, including protection from overgrazing. It is not economically feasible to reseed or fertilize the soils.

CAPABILITY UNIT VIIs-1(15)

In this unit are Cieneba, Henneke, Montara, and Vista soils and the land type Fluvents, stony. These soils have 15 to 50 percent rock outcrops, stones, or cobblestones on the surface. They are coarse sandy loam or fine gravelly sandy loam over granitic rocks or clay loam over serpentine. Fluvents, stony, are 25 to 50 percent stones, cobblestones, and gravel and some sand or sandy loam. The soils are mostly on uplands. They are well drained to excessively drained. Slopes are 5 to 75 percent. The mean annual precipitation is 10 to 55 inches, and the frost-free season is 150 to 280 days. Permeability is generally moderately slow to moderately rapid, but it is very rapid in Fluvents, stony. Runoff is mostly medium to very rapid, and the erosion hazard is mostly moderate to very high. Roots can penetrate to a depth of 7 to 60 inches, and the available water capacity is 1 to 4 inches.

These soils are used for range, watershed, and wildlife habitat.

These soils need a constant vegetative cover, which should be protected from overgrazing and fires. Range improvement practices such as reseeding and fertilizing are not suitable.

CAPABILITY UNIT VIIIe-1(15)

The soils in this unit are Gamboa, Junipero, and Sur soils. Also in this unit are the land types Badland, Dune land, and Pits and dumps. They are well drained to excessively well drained. The soils formed in residuum that was derived from sandstone, schist, or granitic rock on uplands. The surface layer of the soils is sandy loam, very gravelly sandy loam, and stony sandy loam. The surface layer of the land types is highly variable, but Dune land is sand. Slopes range from 5 to 100 percent. The mean annual precipitation is 30 to 80 inches, and the frost-free season is 200 to 300 days. Permeability is moderately rapid to very rapid. Runoff is very slow to very rapid, and the erosion hazard is moderate to very high. Roots can penetrate to a depth of 20 inches or more, and the available water capacity is 1 to 5 inches.

These soils and land types are suited to watershed and wildlife habitat, and they are used for these purposes.

The existing vegetative cover needs to be protected from fire or other destructive forces. Many areas are inaccessible and can be reached only on horseback or on foot.

CAPABILITY UNIT VIIIw-1(15)

In this unit are Alviso soils, Coastal beaches, and Psamments and Fluvents, frequently flooded. They are excessively drained to very poorly drained and formed in alluvium that was derived from mixed sources on tidal flats, in basins, on coastal beaches, and in river channels. Alviso soils have a surface layer of silty clay loam and a substratum that is highly stratified. The texture of Coastal beaches and Psamments and Fluvents is highly variable. Slopes are less than 2 percent in most areas. The mean annual precipitation is 12 to 21 inches, and the frost-free season is about 330 days. Permeability is very rapid to slow. The effective root zone and the available water capacity are variable, depending on depth to water table, salt content, or restrictive layers in the soil.

The soils of this unit are used for recreation and wildlife habitat. Some areas are mined for sand and gravel for construction uses.

The existing vegetative cover should be maintained as much as practical.

CAPABILITY UNIT VIIIs-1(15)

The soils in this unit are Cieneba, Pfeiffer, and Sur soils. Also in this unit is Rock outcrop-Xerorthents. Rock outcrops cover 15 to 90 percent of the surface area. The soils are well drained to excessively drained soils that formed in residuum that was derived from granitic rocks or schist on uplands. The surface layer of the soils is fine gravelly sandy loam, gravelly coarse sandy loam, or stony sandy loam. Slopes are 50 to 85 percent or more. The mean annual precipitation is 15 to 80 inches, and the frost-free season is 200 to 300 days. Permeability is moderately rapid. Runoff is very rapid, and the erosion hazard is very high. Roots can penetrate to a depth of 7 to 60 inches, and the available water capacity is 1 to 6 inches.

These soils are used mainly for wildlife and for their scenic value.

The vegetative cover is needed to reduce the erosion hazard.

Principal Crops

The crops best adapted to the soils of Monterey County are discussed in this section. In addition, the major management concerns when using the soils for crops and pasture are described, and the predicted yields of the main crops are presented for each soil. Detailed information about planning management systems for individual fields or farms is given in the description of each soil in the section "Soil Maps for Detailed Planning."

Because of the wide diversity of soils, long growing season, and adequate supply of water, many crops are grown commercially in Monterey County. Fifty to sixty crops were listed in the Agricultural Commissioner's Annual Crop Report for Monterey County, including tree crops, berries, all types of vegetables, and field crops. Seed crops, nursery stock, bulbs, and flowers also are grown. In 1970 the economic crop value was reported to be $192,562,600 (exclusive of apiary, dairying and livestock).

Virtually all of the better soils are intensively farmed, and most of these soils are irrigated or can be irrigated. Most crops are grown in Land Resource Area 14 and are irrigated. A few crops are dryfarmed in Land Resource Area 15.

Fourteen crops are of major economic importance in Monterey County. In 1970 the 12 irrigated crops in Resource Area 14 were valued at $152,061,000. Two important grain crops, barley and wheat, are dryfarmed in Resource Area 15 and have a value of $2,955,000.

Poor soil structure, surface layer crusting, low available water capacity, poor water penetration, drainage, salts, soil blowing, nematodes, tipburn, mildew, and mosaic transmitted by aphids are some of the problems of growing crops in Monterey County. An additional

problem is that during wet years only one crop can be grown on soils not sufficiently drained. Generally, two or three crops per year can be included in the conservation cropping system.

Yields per acre

The average yields per acre of the principal dryland and irrigated crops that can be expected under a high level of management are shown in tables 2 and 3. The estimates are averages that can be expected over a period of years. In any given year, yields may be higher or lower than those indicated in the tables because of seasonal variations in rainfall and other climatic factors. If little or no information was available on yields of a given crop on a particular soil, estimates were made by comparing this soil with similar soils for which yield information was available. Absence of a yield estimate indicates that the crop is not suited or not commonly grown on the soil or that irrigation of a given crop is not commonly practiced on the soil. Estimates are not given for miscellaneous land types.

The management practices and predicted yields are based mainly on the experience and records of farmers and conservationists, on observations made by personnel of the Soil Conservation Service and the University of California Agricultural Extension Service, and on the Agricultural Commissioner's Annual Crop Report for Monterey County. Results of field trials and demonstrations and available yield data from nearby counties are also considered.

The latest soil and crop management practices used by many farmers in the county are assumed to be used in predicting these yields. A few farmers may be using more advanced practices and obtaining average yields higher than those shown in the tables. Hay and pasture yields are predicted for varieties of grasses and legumes suited to the soil.

The management practices needed to achieve the indicated yields of the various crops depends upon the kind of soil and the crop. Such management provides drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high yielding crop varieties; appropriate tillage practices, including timely tillage and seedbed preparation and tilling when soil moisture is favorable; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residues, barnyard manure, and green manure crops; harvesting crops with the smallest possible loss; and timeliness of all fieldwork.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crop grown, good quality irrigation water is uniformly applied in proper amounts as needed, and tillage is kept to a minimum.

The predicted yields reflect the relative productive capacity of the soils for each of the principal crops. These yields and the suggested management are based on current technology and plant varieties. New developments in crop breeding, control of insects and diseases, irrigation methods, and other management practices will eventually make obsolete some of the practices suggested and yields predicted. Yields are likely to increase as new production technology is developed, but the relative productivity of a given soil compared to other soils is not likely to change.

Crops other than those listed in the tables are grown in the survey area, but because their acreage is small, predicted yields for these crops are not included. The local offices of the Soil Conservation Service and the Cooperative Extension Service can provide information about the productivity and management concerns of the soils for these crops.

On the pages that follow, the general management needed for each listed crop is described, as well as the special management needed for this crop on several groups of suitable soils. The soils in any one group, for example, wet soils and clay soils, are similar in the special management they require for the specified crop.

All requirements for plant nutrients are for the elemental form; for example, pounds per acre of the element phosphorus. The gross irrigation requirement is the total annual plant need per acre less the average effective precipitation. The irrigation requirement is calculated on the assumption that the irrigation system is 70 percent efficient. It is further assumed that the crops listed in the tables are grown under the optimum level of management. The optimum or best level of management is that level which, according to experience, field trials, and research findings, gives the highest possible returns at this time and is within the capabilities of most farmers and ranchers in the county.

ALFALFA

Most alfalfa is grown in the central and southern parts of the Salinas Valley.

Alfalfa is grown in level areas of flood plains, alluvial fans, low terraces, benches, and basins and on sloping fans and terraces. It is best suited to soils that are 3 feet or more deep. Shallow soils will support an alfalfa stand, but yields decrease in 2 or 3 years.

The general soil management practices needed to produce high yields of alfalfa in this area are irrigation, drainage, fertilizing, and timing of fieldwork to prevent crop and soil damage.

A typical cropping system is 3 to 6 years of alfalfa rotated with other irrigated crops common to the area. Root crops such as carrots or sugar beets are not generally seeded immediately after an alfalfa crop because the residual alfalfa roots can interfere with tillage. Green manure crops are not generally used, but the last cutting of alfalfa can be incorporated into the soil to serve as a green manure crop.

Seedbed preparation can include plowing, disking, subsoiling, chiseling, and land planing. Seeding can be done by drilling or by broadcasting the seed and covering it by using a ring roller or harrows. Planting is generally in October and November, but some stands are planted in May and June. The seeding rate ranges from 20 to 60 pounds of seed per acre and averages 35 pounds per acre.

Fertilizer rates range from 18 to 48 pounds of nitrogen, 24 to 90 pounds of phosphorus, and 30 to 60 pounds of potassium per acre annually. Potassium is not frequently used. Manure is applied at a rate of 5 to 15 tons per acre when the soil is being prepared for

TABLE 2.—*Estimated yields of principal irrigated*

[Dashes indicate that the soil is not suited to the crop or the crop

Soil	Alfalfa	Artichokes	Broccoli
	Tons	*20-lb crates*	*21-lb crates*
Alviso silty clay loam, drained	—	225	—
Antioch very fine sandy loam, 0 to 2 percent slopes	10.0	225	300
Antioch very fine sandy loam, 2 to 9 percent slopes	9.0	225	300
Aquic Xerofluvents	8.0	—	275
Arbuckle gravelly loam, 2 to 9 percent slopes	7.5	—	290
Arnold loamy sand, 9 to 15 percent slopes	4.5	—	—
Arroyo Seco gravelly sandy loam, 0 to 2 percent slopes	7.5	—	200
Arroyo Seco gravelly sandy loam, 2 to 5 percent slopes	7.5	—	225
Arroyo Seco gravelly sandy loam, 5 to 9 percent slopes	7.5	—	225
Arroyo Seco gravelly loam, 0 to 2 percent slopes	8.0	—	175
Arroyo Seco gravelly loam, 2 to 5 percent slopes	8.0	—	175
Chualar loam, 0 to 2 percent slopes	7.5	—	250
Chualar loam, 2 to 5 percent slopes	9.0	—	250
Chualar loam, 5 to 9 percent slopes	7.0	—	225
Clear Lake clay	—	250	235
Clear Lake clay, moderately wet	—	500	500
Cropley silty clay, 0 to 2 percent slopes	10.0	275	270
Cropley silty clay, 2 to 9 percent slopes	9.0	300	320
Danville sandy clay loam, 0 to 2 percent slopes	5.5	—	400
Danville sandy clay loam, 2 to 9 percent slopes	5.0	—	375
Diablo clay, 9 to 15 percent slopes	7.5	300	—
Docas silty clay loam, 0 to 2 percent slopes	8.0	—	—
Docas silty clay loam, 2 to 9 percent slopes	7.5	—	—
Elder sandy loam, 0 to 2 percent slopes	7.5	—	375
Elder loam, gravelly substratum, 0 to 2 percent slopes	8.0	—	350
Elkhorn fine sandy loam, 2 to 5 percent slopes	8.0	375	350
Elkhorn fine sandy loam, 5 to 9 percent slopes	8.0	375	350
Elkhorn fine sandy loam, 9 to 15 percent slopes	7.0	300	300
Elkhorn fine sandy loam, thin surface variant, 5 to 15 percent slopes	7.0	200	290
Garey sandy loam, 2 to 9 percent slopes	5.0	—	—
Gloria sandy loam, 2 to 9 percent slopes	8.0	—	200
Greenfield fine sandy loam, 2 to 5 percent slopes	8.0	—	425
Hanford gravelly sandy loam, 0 to 5 percent slopes	8.0	—	—
Lockwood loam, 0 to 2 percent slopes	7.0	—	400
Lockwood shaly loam, 0 to 2 percent slopes	7.5	—	300
Lockwood shaly loam, 2 to 9 percent slopes	7.5	—	290
Lockwood shaly loam, 0 to 2 percent slopes, wet	—	—	250
Metz loamy sand	9.0	—	175
Metz fine sandy loam	11.0	—	200
Mocho silt loam, 0 to 2 percent slopes	7.5	300	210
Mocho silty clay loam, 0 to 2 percent slopes	10.0	300	265
Mocho silty clay loam, 2 to 9 percent slopes	9.0	300	300
Oceano loamy sand, 2 to 15 percent slopes	—	—	200
Pacheco clay loam	10.0	325	380
Parkfield clay, 2 to 9 percent slopes	4.0	—	—
Pico fine sandy loam	10.0	260	325
Placentia sandy loam, 0 to 2 percent slopes	8.0	—	300
Placentia sandy loam, 2 to 9 percent slopes	6.5	—	375
Rincon clay loam, 0 to 2 percent slopes	6.0	—	280
Rincon clay loam, 2 to 9 percent slopes	6.0	—	300
Salinas loam, 0 to 2 percent slopes	10.0	350	370
Salinas clay loam, 0 to 2 percent slopes	10.0	350	395
Salinas clay loam, 2 to 9 percent slopes	11.0	350	400
Santa Ynez fine sandy loam, 2 to 9 percent slopes	7.0	250	250
Sorrento clay loam, 0 to 2 percent slopes	9.0	—	375
Sorrento clay loam, 2 to 9 percent slopes	8.5	—	—
Tujunga fine sand, 0 to 5 percent slopes	6.0	—	—

seeding. Manure may also be applied every 1 or 2 years at a rate of 6 to 10 tons per acre on the longer-lived alfalfa stands.

The gross irrigation requirement is 36 to 48 inches per season. Border-flooding irrigation or sprinklers can be used. The frequency of irrigation ranges from 7 to 24 days, and 3 to 8 inches of water is applied each time. The hot climate in southern Monterey County significantly increases the amount of water used and the frequency of irrigation required.

Cutting generally starts in spring and continues to early in November, depending on the weather.

The hazard of erosion is slight to moderate on gently sloping to strongly sloping soils. These soils require more intensive management and care than nearly level soils to prevent soil, water, and crop loss. Surface irri-

crops under a high level of management

is not ordinarily grown on the soil. Only arable soils are listed]

Carrots	Cauliflower	Celery	Lettuce	Potatoes	Tomatoes	Sugar beets	Strawberries	White beans
50-lb units	*25-lb cartons*	*60-lb crates*	*47-lb cartons*	*100-lb sacks*	*40-lb cartons*	*Tons*	*11½-lb slides*	*100-lb sacks*
600	240	1,000	450	300	1,450	25	—	18
600	240	1,000	575	300	1,450	20	—	17
1,200	480	1,035	565	300	1,350	26	3,165	20
1,000	380	—	425	260	1,100	21	—	24
—	—	—	—	—	—	28	3,500	—
1,240	260	—	500	300	1,300	29	3,835	22
1,200	260	—	490	300	1,350	33	3,835	18
1,200	260	—	490	300	1,300	30	3,835	20
1,400	240	—	500	320	1,400	29	3,665	24
1,320	240	—	565	335	1,250	32	3,665	28
1,080	448	930	650	325	1,250	38	4,165	24
1,120	455	900	425	350	1,200	38	4,165	24
1,000	425	865	420	385	1,200	25	4,250	26
920	550	1,000	560	—	—	28	—	22
1,000	505	1,050	500	—	—	30	—	30
1,400	410	1,035	525	275	1,450	28	—	25
1,200	215	850	550	310	1,450	24	—	28
800	375	900	500	250	1,350	28	3,335	20
880	425	965	490	250	1,300	30	3,500	20
—	500	—	—	—	—	25	—	25
1,200	—	—	445	—	1,500	26	—	26
1,120	—	—	435	—	1,450	27	—	25
1,200	300	—	475	335	1,350	36	3,835	27
1,320	280	—	555	260	1,250	34	3,665	23
1,200	420	1,000	555	240	1,435	24	4,000	17
1,120	410	935	540	255	1,300	22	3,835	17
1,000	400	—	425	230	—	22	3,875	—
960	380	—	425	—	—	20	3,665	—
1,000	—	—	415	260	1,400	36	—	18
960	420	965	425	275	1,350	26	3,165	26
800	400	1,035	510	295	1,300	32	—	22
—	—	—	—	—	—	—	—	—
1,320	460	—	640	350	1,500	29	—	28
1,320	400	—	550	260	1,450	35	—	26
1,230	380	—	640	320	1,700	35	—	24
1,000	240	—	425	—	1,000	30	—	28
1,040	400	—	595	365	1,425	30	—	28
1,200	420	—	530	360	1,450	29	—	27
760	340	800	535	360	1,300	35	3,835	30
720	340	835	745	355	1,700	28	3,835	30
720	320	1,000	710	355	1,700	27	3,835	30
1,000	240	—	—	230	—	—	—	—
795	455	1,125	545	275	1,510	29	—	32
—	—	—	—	—	—	—	—	—
1,020	340	850	545	315	1,750	27	—	28
1,200	450	900	450	255	1,000	25	3,665	28
960	340	965	420	250	1,000	27	3,165	25
800	480	—	425	310	1,445	30	—	26
800	520	—	500	280	1,250	25	—	22
1,320	560	850	530	340	1,450	35	4,335	33
1,280	565	905	515	425	1,450	34	4,335	37
1,280	540	910	515	400	1,500	33	4,500	32
—	200	—	425	—	—	—	3,500	—
1,240	520	900	575	340	1,485	30	—	25
1,040	520	900	570	345	1,435	30	—	25
—	—	—	—	—	—	—	—	20

gation should be restricted to slopes of less than 3 percent, and sprinklers and cross-slope tillage should be used on steeper slopes. Sprinklers are commonly used during seed germination and emergence on fields irrigated by the border flooding method.

Alfalfa roots do not penetrate deeply into soils that have a slowly or very slowly permeable subsoil, and thus cannot fully utilize all of the available water. Because of this limitation, these soils require very careful irrigation at short intervals. Alfalfa stands are less productive and short-lived on these soils. The amount of water used for the season is less on these soils because the clayey subsoil restricts deep percolation.

Sandy or gravelly soils are difficult to irrigate because of the low available water capacity and rapid permeability. Wind damage can be a hazard to young

TABLE 3.—*Estimated yields of principal dryland crops under a high level of management*

[Dashes indicate that the soil is not suited to the crop or the crop is not ordinarily grown on the soil. Only arable soils are listed]

Soil	Barley	Wheat
	100-lb sacks	*100-lb sacks*
Alo silty clay, 2 to 9 percent slopes	15	12
Alo silty clay, 9 to 15 percent slopes	18	10
Antioch very fine sandy loam, 0 to 2 percent slopes	20	20
Antioch very fine sandy loam, 2 to 9 percent slopes	20	20
Arbuckle gravelly loam, 2 to 9 percent slopes	20	10
Arbuckle gravelly loam, 9 to 15 percent slopes	20	16
Arnold loamy sand, 9 to 15 percent slopes	19	-------
Arroyo Seco gravelly sandy loam, 0 to 2 percent slopes	25	14
Arroyo Seco gravelly sandy loam, 2 to 5 percent slopes	22	12
Arroyo Seco gravelly sandy loam, 5 to 9 percent slopes	22	12
Arroyo Seco gravelly loam, 0 to 2 percent slopes	20	15
Arroyo Seco gravelly loam, 2 to 5 percent slopes	20	15
Ayar silty clay, 5 to 15 percent slopes	28	20
Ayar silty clay, 15 to 30 percent slopes	26	20
Chamise shaly loam, 9 to 15 percent slopes	15	10
Chualar loam, 0 to 2 percent slopes	15	15
Clear Lake clay	15	-------
Cropley silty clay, 0 to 2 percent slopes	30	10
Cropley silty clay, 2 to 9 percent slopes	20	10
Danville sandy clay loam, 0 to 2 percent slopes	20	20
Danville sandy clay loam, 2 to 9 percent slopes	15	15
Diablo clay, 9 to 15 percent slopes	30	20
Diablo clay, 15 to 30 percent slopes	30	20
Docas silty clay loam, 0 to 2 percent slopes	20	18
Docas silty clay loam, 2 to 9 percent slopes	25	15
Elder sandy loam, 0 to 2 percent slopes	20	15
Garey sandy loam, 2 to 9 percent slopes	18	-------
Gloria sandy loam, 2 to 9 percent slopes	15	-------
Gloria sandy loam, 9 to 15 percent slopes	15	-------
Greenfield fine sandy loam, 2 to 5 percent slopes	20	20
Greenfield fine sandy loam, 5 to 9 percent slopes	20	20
Greenfield fine sandy loam, 9 to 15 percent slopes	20	20
Hanford gravelly sandy loam, 0 to 5 percent slopes	18	-------
Linne silty clay loam, 5 to 15 percent slopes	14	10
Linne silty clay loam, 15 to 30 percent slopes	18	16
Linne-Diablo complex, 9 to 15 percent slopes	20	20
Linne-Diablo complex, 15 to 30 percent slopes	20	20
Linne-Shedd silty clay loams, 15 to 30 percent slopes	19	14
Lockwood loam, 0 to 2 percent slopes	25	20
Lockwood loam, 2 to 9 percent slopes	25	20
Lockwood shaly loam, 0 to 2 percent slopes	25	20
Lockwood shaly loam, 2 to 9 percent slopes	25	20
Lockwood shaly loam, 9 to 15 percent slopes	20	10
Lockwood shaly loam, 0 to 2 percent slopes, wet	20	10
Los Osos clay loam, 9 to 15 percent slopes	20	10
Los Osos clay loam, 15 to 30 percent slopes	18	10
McCoy clay loam, 15 to 30 percent slopes	19	18
McCoy-Gilroy complex, 15 to 30 percent slopes	15	13
Metz loamy sand	15	12
Metz fine sandy loam	20	18
Metz complex	12	10
Mocho silt loam, 0 to 2 percent slopes	20	15
Mocho silty clay loam, 0 to 2 percent slopes	20	18
Micho silty clay loam, 2 to 9 percent slopes	19	14
Nacimiento silty clay loam, 9 to 15 percent slopes	20	12
Nacimiento silty clay loam, 15 to 30 percent slopes	21	14
Oceano loamy sand, 2 to 15 percent slopes	30	-------
Pacheco silty clay loam, occasionally flooded	20	18
Parkfield clay, 2 to 9 percent slopes	15	10
Placentia sandy loam, 0 to 2 percent slopes	20	20
Placentia sandy loam, 2 to 9 percent slopes	18	20
Rincon clay loam, 0 to 2 percent slopes	19	16
Rincon clay loam, 2 to 9 percent slopes	25	16
Rincon clay loam, 9 to 15 percent slopes	25	15
Rincon clay loam, 15 to 30 percent slopes	19	16
Salinas loam, 0 to 2 percent slopes	20	18
Salinas clay loam, 0 to 2 percent slopes	19	15
Salinas clay loam, 2 to 9 percent slopes	24	19
Santa Lucia shaly clay loam, 2 to 15 percent slopes	15	10
Santa Lucia shaly clay loam, 15 to 30 percent slopes	15	10
Shedd silty clay loam, 9 to 15 percent slopes	15	10
Snelling-Greenfield complex, 5 to 15 percent slopes	20	18
Sorrento clay loam, 0 to 2 percent slopes	18	12
Sorrento clay loam, 2 to 9 percent slopes	25	18
Tujunga fine sand, 0 to 5 percent slopes	18	14

alfalfa plants, and a fast growing "nurse" crop of barley, rye, or oats is frequently planted with the crop for protection. Sprinklers should be used at an interval of 5 to 12 days, and an average of 40 inches of water is applied annually. Frequent applications of fertilizer and manure are needed.

Clay soils are hard to cultivate without compacting the soil. Timing of fieldwork and cutting are critical because these soils tend to be either too wet or too dry for cultivation. Manuring and vertical mulching are important in maintaining tilth and soil structure.

Subsurface drainage systems and land leveling or shaping are required to grow alfalfa on soils that have a high water table. The water table must be lowered to attain an adequate rooting depth. Good management of irrigation water and correct timing of cuttings are needed to prevent plant nutrient leaching, water ponding, soil deterioration, and crop loss.

ARTICHOKES

The most important factor in growing artichokes is a cool, foggy summer climate. Artichoke cultivation therefore is limited to areas near the coast, usually within 5 miles of Monterey Bay.

Artichokes are grown in nearly level areas of basins, swales, and flood plains, on gently sloping to moderately sloping fans and terraces, and on rolling hills.

Artichokes are planted as a permanent crop that produces for 10 years or more before rotation or replanting is needed. A typical cropping system is 4 to 7 years of artichokes rotated for 1 or 2 years with other irrigated row crops such as celery, cauliflower, cabbage, or broccoli. Cover crops or green manure crops are not generally planted, but volunteer grasses and mustard grow between the rows and later are incorporated into the soil.

Preparing the soil for planting includes chiseling or subsoiling and disking. Then in February and March, 620 to 680 root segments are planted per acre in rows 8 feet apart. On the steeper slopes contour or cross-slope planting helps control erosion from winter rain or irrigation.

The plants are cultivated to control weeds and to incorporate tops, stems, and fertilizers into the soil. After irrigation, cultivation helps break up soil crusts and smooth the surface to aid in harvesting. Cultivation is by mechanical means.

Adequate amounts of plant nutrients are needed to produce high-quality artichokes. Fertilizer rates vary widely, depending on soil texture and frequency of fertilizer application. Lime can be used to help control crusting. Nitrogen, phosphorus, and potassium are applied annually, and 8 to 10 tons of manure is generally applied every third year. Water-soluble nitrogen fertilizers can be applied by injection into a sprinkler system.

The gross irrigation requirement is approximately 18 inches of water per season. Furrow irrigation or overhead sprinklers can be used. Water is applied 5 to 8 times per season by sprinklers or 4 or 5 times per season by the furrow method. Many growers use both methods on the same field. The frequency of irrigation is regulated by climate and the size and age of plants. Artichokes are deep rooted, and in deep, well drained soils the roots extend to a depth of 6 feet.

Harvesting begins with the maturing of the first buds in September and continues until May. Pickings are generally made each week. Peak production is in February and March.

The hazard of erosion is slight to moderate on gently sloping and moderately sloping soils. These soils require more intensive management, including the use of cover and green manure crops in the conservation cropping system. Sprinkler irrigation is the best method on these soils, and tillage should be across the slope or on the contour.

Shallow soils that have a slowly or very slowly permeable subsoil require very careful irrigation to prevent overirrigation or the serious loss of soil and water or both. Cover crops and minimum tillage are needed. Sprinkler irrigation is used exclusively on soils that have slopes of more than 3 percent. Irrigation must be more frequent because the rooting depth is shallow.

Clay soils are difficult to cultivate without compacting the soil. Timing of fieldwork is critical because the soils tend to be either too wet or too dry to work. Manuring, incorporating crop residues into the soils, vertical mulching, and using green manure crops are very important in maintaining tilth and soil structure. Tillage on the contour or across the slope is best.

Tiling or open drainage ditches and land leveling or shaping are required to grow artichokes on soils that are wet or have a high water table. Good management of irrigation water is needed, as well as management to prevent leaching, compaction, and crop loss.

BROCCOLI

Broccoli is a cool-season or winter crop grown near the coast. Average monthly temperatures of 60° F or slightly lower are best for the production of a quality crop. Broccoli can be grown in most areas of the Salinas and Pajaro Valleys, depending on frost conditions.

Broccoli is grown in nearly level areas of flood plains, alluvial fans, low terraces, benches, basins, and swales and on gently sloping to moderately sloping alluvial fans and terraces.

The general soil management practices needed to produce high yields of broccoli in this area are surface or sprinkler irrigation, drainage, fertilization, and timing of fieldwork to prevent soil compaction.

A typical cropping system is one or more crops of broccoli rotated with other irrigated crops common to the area. Barley and rye or vetch, or both, are grown as a green manure crop after every third or fourth crop.

Seedbed preparation includes subsoiling, plowing, disking, chiseling, and land planting. Fields are then listed, and beds are shaped and planted. From February through November, 1½ to 3 pounds of seed are planted per acre. Transplants may be used. The crop is mechanically cultivated and hand thinned and weeded.

Combinations of fertilizer are applied several times annually at rates that vary widely but average about 200 pounds of nitrogen, 100 pounds of phosphorus, and 50 pounds of potassium a year. Occasionally 7 to 10 tons per acre of steer manure is also applied.

The gross irrigation requirement is about 11 inches of water, but can be as much as 14 inches on deep sandy soils. Furrow irrigation is commonly used, but some sprinklers are used during preplanting and early growth stages. The frequency of irrigation depends on seasonal rainfall, soil characteristics, and stage of plant growth.

Harvesting extends from March through September.

The hazard of erosion is slight to moderate on gently sloping to moderately sloping soils. These soils require somewhat more intensive management and care than nearly level soils to prevent soil, water, and crop loss. Sprinklers are commonly used during germination and emergence of plants and are generally satisfactory for subsequent irrigations. Cover and green manure crops are necessary in the cropping system. Tillage should be on the contour or across the slope.

Broccoli roots do not penetrate deeply into soils that have a slowly or very slowly permeable subsoil, and thus cannot extract all of the available water. Where root growth is restricted, the soils require very careful irrigation, and less water should be used to prevent

over-irrigation. If the amount of irrigation water applied exceeds the available water capacity of the surface soil, temporary waterlogging and rapid runoff can result. Sprinklers should be used on slopes of 5 percent or more.

Sandy or gravelly soils are difficult to irrigate because they have a low available water capacity and rapid permeability. Sprinklers are used until after plant germination, and then furrow irrigation can be used at a frequency of every 5 to 6 days throughout the growing season. A total of 14 inches of water is applied. The use of fertilizer, manure, green manure crops, and crop residue is necessary to maintain the organic-matter content. Windbreaks of trees and sunflowers or shrubs, or both, may be required to prevent wind damage and to help control soil blowing.

Clay soils are difficult to cultivate without compacting the soil. Timing of fieldwork is critical because these soils tend to be either too wet or too dry to work. Manuring, incorporating crop residues into the soil, vertical mulching, and using green manure crops are very important in maintaining tilth and soil structure. Because harvesting is frequently done during wet winter months, when compaction of the soils is especially likely, the use of equipment should be minimized whenever possible. Tillage on the contour or across the slope is best.

Root growth is restricted in wet soils by a high water table or excess salts, or both. Tiling or drainage ditches, or both, and surface land leveling or shaping are required to grow broccoli on these soils. Good management of irrigation water is needed, as well as management to prevent soil compaction and crop loss.

CARROTS

The carrot crop is grown in the Salinas Valley and in the Pajaro Valley near Watsonville. Carrots are an all year crop in Monterey County. They are best adapted to areas that have relatively long periods of mild weather that is free of extremes of temperature or moisture.

Carrots are grown on many soils, but they do best on deep sandy loams and organic soils. Cloddy, stony, trashy, or very shallow soils are undesirable. Carrots are grown in nearly level areas of flood plains, alluvial fans, basins, swales, and old lake beds.

The general soil management practices needed to produce high yields of carrots are irrigation, drainage, fertilization, weed control, and timing of fieldwork to prevent soil compaction.

A typical cropping system is carrots rotated with other irrigated crops common to the area. Barley and rye or vetch, or both, are grown as a green manure crop after every third or fourth crop.

Seedbed preparation is very important because the edible roots of the carrot can become misshapen as the result of poor soil structure or the presence of stones or trash in the soil. The soils need subsoiling, plowing, disking, chiseling, and land planing. Fields are then listed, and the beds are shaped and planted. From December through June, 3/4 pound to 4 pounds of seed are planted per acre. The average planting rate is 3 pounds per acre, but 3/4 pound is used in precision planting. The crop is mechanically cultivated, thinned, and weeded as necessary. Thinning may also be done by hand if labor is available. Herbicides are used at early stages of growth to control weeds.

Combinations of fertilizer are applied several times annually at rates that vary widely. 160 to 236 pounds of nitrogen, 30 to 80 pounds of phosphorus, and 0 to 80 pounds of potassium are appllied per acre annually. Also, 7 to 10 tons per acre of steer manure can be applied every 3 or 4 years.

The gross irrigation requirement is about 30 inches of water per season. Furrow irrigation or sprinklers or a combination of both can be used. The frequency of irrigation ranges from 10 to 14 days, and 4 or 5 inches of water is applied at periods of maximum (peak) water use.

Harvesting extends from July through January.

The hazard of erosion is slight to moderate on gently sloping to strongly sloping soils. These soils require more intensive management than nearly level soils to prevent soil, water, and crop loss. Furrow irrigation should be restricted to slopes of less than 3 percent, and sprinklers should be used on steeper slopes. Sprinklers are generally used during periods of plant germination and emergence. Cover and green manure crops are necessary in the conservation cropping system. Tillage should be on the contour or across the slope.

Carrot roots do not penetrate deeply into soils that have a slowly or very slowly permeable subsoil, and thus cannot extract all of the available water. These soils require careful management to prevent overirrigation and waterlogging. The amount of irrigation water used for the season is somewhat less on these soils because the clayey subsoil very slowly yields some water for plant use. Sprinklers should be used on slopes of 3 percent or more.

Sandy or gravelly soils are difficult to irrigate because of the low available water capacity and rapid permeability. Sprinklers are used at intervals of 7 to 10 days, and 30 inches of water is applied. The use of fertilizers, manure, green manure crops, and crop residues is necessary to grow carrots on these soils. Windbreaks of trees and sunflowers or shrubs or both, may be necessary to prevent wind damage to young plants and to help control soil blowing on bare fields.

Clay soils are difficult to cultivate without compacting the soil. Timing of fieldwork is critical because these soils tend to be either too wet or too dry to work. Manuring, incorporating crop residues into the soil, vertical mulching, and using green manure crops are needed for maintaining tilth and soil structure, which must be done in order to produce fine-quality carrots that are uniform in size and lacking in deformities.

Tile drains or open drainage ditches, or both, and surface land leveling or shaping are necessary on soils that have a high water table or a wetness problem. Careful management of irrigation water is needed to produce high yields and to prevent the crop loss that would result from leaching and ponding.

CAULIFLOWER

Cauliflower generally requires a cool, moist climate and is grown in rotation with artichokes, celery, and similar crops. Most of the cauliflower crop is grown in the Salinas and Pajaro Valleys near the coast where fog and cool winds modify climatic conditions throughout the year.

Cauliflower is grown in nearly level areas of flood plains, alluvial fans, low terraces, benches, and basins and on gently sloping to moderately sloping alluvial fans and terraces. Soils should be well drained, have adequate available water capacity, and be at least 2 feet deep to a hardpan or root-restricting layer.

The general soil management practices needed to produce high yields of cauliflower in this area are irrigation, drainage, fertilization, pest control, and timing of fieldwork to prevent soil compaction.

A typical cropping system is one or more crops of cauliflower rotated with other irrigated crops common to the area. Barley and rye or vetch, or both, are grown as a green manure crop every third or fourth year.

Seedbed preparation includes subsoiling, plowing, disking, chiseling, and land planing. Fields are then listed, and the beds are shaped and planted. Throughout the year, 1/2 pound to 1 1/4 pounds of seed are planted per acre. One-third pound is used in precision planting. The crop is mechanically cultivated, thinned, and weeded as necessary, or hand labor may be used if available.

Fertilizer is applied several times throughout the growing season. The amount of fertilizer applied varies from 200 to 300 pounds per acre of nitrogen, 48 to 200 pounds of phosphorus and 25 to 115 pounds of potassium per acre annually. Also, 3 to 10 tons per acre of manure is generally applied every second or third year.

The gross irrigation requirement is about 13 inches of water per season. Furrow irrigation is generally used, but some sprinklers are used during preplanting and early growth stages. During the period of maximum water use 2 to 4 inches of irrigation water is applied every 10 to 18 days. Sprinklers alone are generally not used for growing this crop to maturity.

Cauliflower is harvested throughout the year. Trailers are dragged through the fields by heavy tractors even during the wettest part of the year, cutting deep ruts and compacting the finer textured soils. This should be avoided or minimized wherever possible.

The hazard of erosion is slight to moderate on gently sloping to strongly sloping soils. These soils require more intensive management than nearly level soils to prevent soil, water, and crop loss. Plantings should be restricted to slopes of less than 3 percent, where furrow irrigation can be used. Sprinklers are often used during the period of plant germination and emergence, but are not generally satisfactory for subsequent irrigations. Cover and green manure crops are needed in the cropping system. Tillage should be on the contour or across the slope.

Cauliflower roots do not penetrate deeply into soils that have a slowly permeable subsoil and thus cannot extract all of the available water. These soils require careful management to prevent possible overirrigation. They are easily waterlogged. The amount of irrigation water needed during the season is less on these soils because the clayey subsoil prevents the loss of water through deep percolation and yields some water for plant use.

Sandy or gravelly soils are difficult to irrigate because of the low available water capacity and rapid permeability. Sprinklers should be used until after plant germination, and then furrow irrigation can be used. One inch of water is applied every 5 to 6 days throughout the growing season. A total of 14 inches of water is applied. The use of fertilizers, manure, green manure crops, and crop residues is particularly important for growing cauliflower on these soils. Windbreaks of trees and sunflowers or shrubs, or both, may be needed to prevent wind damage to young plants and to minimize soil blowing on unprotected soil prepared for planting.

Clay soils are difficult to cultivate without compacting the soil. Timing of fieldwork is critical because these soils tend to be either too wet or too dry to work. Manuring, incorporating crop residues into the soil, vertical mulching, and using green manure crops are very important in maintaining tilth and soil structure.

Root growth can be restricted in wet soils by salts or a high water table, or both. Tiling or open drainage ditches, or both, and land leveling or shaping are required to grow cauliflower on these soils. Very careful management of irrigation water is needed to produce high yields, and to prevent the crop loss that would result from leaching and compaction.

CELERY

Celery is a cool-season crop requiring optimum climatic and moisture conditions and a long growing season. It is grown from the Salinas area south to King City and in the Pajaro Valley near Watsonville. In summer cultivation is limited to the cooler areas.

Celery is grown in nearly level areas of flood plains, alluvial fans, low terraces, and swales and on gently sloping to moderately sloping fans and terraces. It grows best on deep, well drained, fertile soils that are free of excessive salt or alkali.

The general soil management practices needed to produce high yields of celery in this area are irrigation, drainage, fertilization, and timing of all fieldwork to prevent soil compaction.

A typical cropping system is celery rotated with other irrigated crops common to the area. Occasionally, such green manure crops as barley and rye or vetch, or both, are grown. Crop rotation is used to help control diseases and pests.

Seedbed preparation includes subsoiling, plowing, disking, cultipacking, and land planing. Fields are then listed, and the beds are shaped and planted. From February through July, about 1 pound of untreated seed or 7 pounds of coated seed are planted per acre. Soil fumigation, or treatment for diseases, can precede planting. The crop is mechanically cultivated, thinned, and weeded as necessary. Some thinning and weeding may also be done by hand if labor is available.

Several applications of fertilizer, including a preplanting application, are used during the growing season. Rates of application vary widely. From 200 to 400 pounds of nitrogen, 150 to 250 pounds of phosphorus, and 150 to 200 pounds of potassium are applied per acre annually. Also, 2 to 10 tons of steer and chicken manure are generally applied each year before planting.

The gross irrigation requirement is about 45 to 70 inches of water per season. Furrow irrigation is generally used, but some sprinklers are used before planting. The frequency of irrigation is about 3 to 5 days during the period of peak use, and the amount of water used is adjusted for soil, weather, and final stages of

growth. Tenderness and succulence in celery requires a constant and steady moisture supply. Frequent irrigations are needed to germinate celery seed, but after the crop is established, they can be reduced to once every 10 to 12 days until the crop nears maturity and harvesting.

Celery is currently harvested throughout the year, except during January when it is kept from the soil to control mosaic disease. Trailers are moved through the fields by heavy tractors even during the wettest part of the year, cutting deep ruts and compacting the finer textured soils. This should be avoided or minimized wherever possible.

The hazard of erosion is slight to moderate on gently sloping and moderately sloping soils. These soils require more intensive management than nearly level soils to prevent soil, water, and crop loss. Plantings should be restricted to slopes of less than 3 percent, where furrow irrigation can be used. Sprinklers are often used during the period of plant germination and emergence, but are not generally satisfactory for subsequent irrigations. Cover and green manure crops are needed in the conservation cropping system. Tillage should be on the contour or across the slope.

Celery roots do not penetrate deeply into soils that have a slowly or very slowly permeable subsoil, and thus cannot extract all of the available water. These soils require very careful light irrigation at more frequent intervals. The amount of irrigation water required for the season is less on these soils because the clayey subsoil prevents the loss of water through percolation.

Clay soils are difficult to cultivate without compacting the soil. Timing of fieldwork is critical because these soils tend to be either too wet or too dry to work. Manuring, incorporating crop residues into the soil, vertical mulching, and using green manure crops are needed to maintain tilth and soil structure. Harvesting should not be done when the soils are excessively moist.

Root growth can be restricted in wet soils by salts or a high water table, or both. Tiling or open drainage ditches, or both, and land leveling or shaping are necessary to grow celery on these soils. Careful management of irrigation water is needed to produce high yields, as well as to prevent crop loss and soil damage.

SUMMER LETTUCE

Most of the summer lettuce crop is grown between Castroville and King City and in the Pajaro Valley near Watsonville. From King City south, very little summer lettuce is grown because of the adverse climate. Lettuce is not generally grown along the coast because of mildew caused by fog and dampness.

Lettuce is grown in nearly level areas of flood plains, alluvial fans, low terraces, benches, basins, and swales and on gently sloping to strongly sloping alluvial fans and terraces.

The general soil management practices needed to produce high yields of lettuce in this area are irrigation, drainage, fertilization, and timing of fieldwork to prevent soil compaction.

A typical cropping system is one or more crops of lettuce rotated with other irrigated crops common to the area. Barley and rye or vetch, or both, are grown as a green manure crop after every third or fourth crop.

Seedbed preparation includes subsoiling, plowing, disking, chiseling, and land planing. Fields are then listed, and the beds are shaped and planted. From March through June, ¼ pound to 1¼ pounds of uncoated seed or two pounds or more of coated seed are planted per acre. The crop is mechanically cultivated and hand thinned and weeded as necessary.

Combinations of fertilizer are applied several times annually at rates that vary widely. From 100 to 280 pounds of nitrogen, 10 to 110 pounds of phosphorus, and 10 to 130 pounds of potassium are applied per acre annually. Also, 2 to 10 tons per acre of steer manure is sometimes applied before planting.

The gross irrigation requirement is about 15 inches of water per season. Furrow irrigation is generally used, but some sprinklers are used during preplanting and early growth stages. During periods of maximum water use, 3 inches of water is applied at intervals of about 18 days. South of Soledad, peak use increases, and 3 inches of irrigation water is applied every 13 days until a total of 18 inches is reached.

Harvesting extends from July to November.

The hazard of erosion is slight to moderate on gently sloping to strongly sloping soils. These soils require more intensive management than nearly level soils to prevent soil, water, and crop loss. Plantings should be restricted to slopes of less than 5 percent, where furrow irrigation can be used. About 2 inches of irrigation water is applied every 10 to 13 days until a total of 16 inches is reached. Sprinklers are commonly used during periods of plant germination and emergence, but are not satisfactory for subsequent irrigations. Cover and green manure crops are needed in the cropping system. Tillage should be across the slope or on the contour.

Summer lettuce roots do not penetrate deeply into soil that has a slowly or very slowly permeable subsoil, and thus cannot extract all of the available water. These soils require 2 inches of irrigation water every 16 to 18 days and care must be taken to prevent overirrigation. The amount of irrigation water used is about 12 inches per season.

Sandy to gravelly soils are difficult to irrigate because of the low available water capacity and rapid permeability. Wind damage can be a hazard to young plants grown in these soils. Sprinklers should be used until after plant germination, and then furrow irrigation can be used. Applications of 1 inch of water are made every 5 to 6 days throughout the growing season. A total of 14 inches is applied. The use of fertilizers, manure, green manure crops, and crop residue is necessary to grow lettuce on these soils and to maintain a low content of organic matter.

Clay soils are difficult to cultivate without compacting the soil. Timing of fieldwork is critical because these soils tend to be either too wet or too dry to work. Manuring, incorporating crop residues into the soil, vertical mulching, and using green manure crops are important in maintaining tilth and soil structure.

Tiling and open drainage ditches and land leveling or shaping for irrigation water control are required to grow summer lettuce on soils that are wet or have a high water table. Careful management of irrigation

water is needed, as well as management to prevent leaching and compaction and subsequent crop loss.

POTATOES

Most of the potato crop is grown from the vicinity of Salinas south to King City.

Potatoes are grown in nearly level areas of flood plains, alluvial fans, and low terrraces and on gently sloping to moderately sloping alluvial fans and terraces. Soils should be well drained and sandy; clay soils can produce deformed or cracked potatoes. Potatoes harvested after winter may be damaged by rot caused by ponded water or a high water table. Because of the combination of mild climate and favorable soils in this county, it is common to store potatoes in the soil for up to 6 or 7 months through the rainy winter season and dig them throughout the year.

The general soil management practices needed to produce high yields of potatoes in this area are irrigation, fertilization, and timing of fieldwork to prevent soil deterioration.

A typical cropping system is potatoes rotated with other irrigated crops common to the area. Barley and rye or vetch, or both, are grown as a green manure crop every 2 to 4 years.

Seedbed preparation includes subsoiling, plowing, disking, chiseling, and land planing. Fields are then listed, and beds are shaped, rolled, and planted. From March through June, 22 to 35 sacks of seed potatoes are planted per acre, and the average is 27 sacks per acre. The crop is mechanically cultivated, thinned, and weeded as necessary. A limited amount of hand labor is used.

Fertilizer is applied several times during the growing season at rates that vary widely. From 150 to 250 pounds of nitrogen, 80 to 180 pounds of phosphorus, and 80 to 260 pounds of potassium are applied per acre annually. Also, 5 to 10 tons per acre of steer manure is occasionally applied before planting.

The gross irrigation requirement is about 24 inches of water per season. Furrow irrigation or sprinklers, or both, can be used. During peak water use 3½ inches of water is applied every 10 days.

Harvesting generally starts in September and continues into February or March, although most of the crop is harvested from October through December.

The hazard of erosion is slight to moderate on gently sloping to strongly sloping soils. These soils require more intensive management than nearly level soils to prevent soil, water, and crop loss. Furrow irrigation should be restricted to slopes of less than 3 percent, and sprinklers should be used on steeper slopes. Portable sprinklers are commonly used during the period of plant germination and emergence in fields irrigated by the furrow method. Cover and green manure crops are necessary in the cropping system. Tillage should be across the slope or on the contour.

Potato roots do not penetrate deeply or form properly in soils that have a slowly or very slowly permeable subsoil, and thus cannot extract all of the available water. These soils require light irrigation at more frequent intervals and care must be taken to avoid overirrigation. They are easily waterlogged. The amount of irrigation water needed during the season is less on these soils because the clayey subsoil prevents loss of water through deep percolation.

Sandy or gravelly soils are difficult to irrigate because of the low available water capacity and rapid permeability. Wind damage can be a hazard to young plants grown on these soils. Sprinklers should be used throughout the growing season at intervals of 7 to 10 days. A total of 30 inches of water is applied. Fertilizer, manure, green manure crops, and crop residues are needed to maintain organic-matter content. Windbreaks of trees and sunflowers or shrubs, or both, may be needed to prevent serious wind damage to young plants and to help to minimize soil blowing on bare fields. A high yield of potatoes can be produced on these soils with proper management.

Clay soils are difficult to cultivate without compacting the soil. Timing of fieldwork is critical because these soils tend to be either too wet or too dry to work. Manuring, incorporating crop residues into the soil, vertical mulching, and using green manure crops are needed to maintain tilth and soil structure which is important if high-quality potatoes are to be produced.

Tiling or open drainage ditches, or both, and land leveling or shaping are needed to grow potatoes on soils that are wet or have a high water table. Careful management of irrigation water is needed to produce high yields, as well as management to prevent leaching, ponding, a high water table, and the subsequent crop loss.

TOMATOES

Most tomatoes are grown south of Salinas between Soledad and King City. Tomatoes need an average monthly temperature of 65° F or more. Temperature affects the setting of the fruit and the formation of the desirable red color.

Tomatoes are grown in nearly level areas of flood plains, alluvial fans, low terraces, and basins and on gently sloping to strongly sloping alluvial fans and terraces.

The general soil management practices needed to produce high yields of tomatoes in this area are irrigation, drainage, fertilization, and timing of fieldwork to prevent soil compaction.

A typical cropping system is tomatoes rotated with other irrigated crops common to this area. Barley and rye or vetch, or both, are grown as green manure crops every third or fourth year.

Seedbed preparation includes disking and chiseling and occasional plowing, subsoiling, and land planing. Fields are then listed, rolled, and planted. From January through April, ¾ to 1 pound of seed per acre is precision planted. Most of the acreage is planted in February. The crop is mechanically cultivated, thinned, and weeded.

Fertilizer is applied several times throughout the growing season at rates that vary widely. From 130 to 200 pounds of nitrogen, 36 to 260 pounds of phosphorus, and 20 to 200 pounds of potassium are applied per acre annually. Manure is not generally used.

The gross irrigation requirement is about 24 inches in 5 to 8 applications. Sprinklers and furrow irrigation are used. Sprinklers are used during the preplanting and early growth stages. During the period of peak

water use, 3 to 8 inches of water is applied at 10 to 28 day intervals. The southern part of the Salinas Valley uses more frequent irrigation because of higher daily maximum temperatures and wind velocities.

Harvesting can begin as early as July, but is generally in September and October. Mechanical harvesting is sometimes used.

The hazard of erosion is slight to moderate on gently sloping to strongly sloping soils. These soils require more intensive management than nearly level soils to prevent soil, water, and crop loss. Furrow irrigation should be restricted to slopes of less than 3 percent, and sprinklers should be used on steeper slopes. Sprinklers are often used during the period of plant germination and emergence. Cover and green manure crops are needed in the cropping system. Tillage should be across the slope or on the contour.

Tomato roots do not penetrate deeply into soils that have a slowly or very slowly permeable subsoil and thus cannot extract all of the available water. These soils require more frequent light irrigations, and care must be taken to avoid overirrigation. The amount of water applied during the season is less on these soils because the clayey subsoil prevents the loss of water through deep percolation.

Sandy or gravelly soils are difficult to irrigate because of the low available water capacity and rapid permeability. Sprinklers should be used during the early stages of plant growth, and more water must be applied on these soils. Manure, green manure crops, and crop residue are needed to maintain organic-matter content. Windbreaks of trees and sunflowers or shrubs, or both, may be needed to prevent damage to young plants and to control soil blowing on bare fields.

Clay soils are difficult to cultivate without compacting the soil. Timing of fieldwork is critical because these soils tend to be either too wet or too dry to cultivate. Manuring, incorporating crop residues into the soil, vertical mulching, and using green manure crops are important for maintaining tilth and soil structure.

Subsurface drainage systems and land leveling or shaping are required to grow tomatoes on soils that are wet or have a high water table. Good management of irrigation water is needed, as well as management to prevent leaching and compaction and subsequent crop loss.

SUGAR BEETS

Sugar beets grow well in all parts of Monterey County. The largest sugar beet acreage is between Salinas and San Ardo, and other acreages are in the Lockwood and Pajaro Valleys.

Sugar beets are grown in nearly level and gently sloping to strongly sloping areas of flood plains, alluvial fans, terraces, benches, basins, and swales. They grow best on well drained silt loams and clay loams, but they are not as sensitive to soil limitations as other row crops.

The general soil management practices needed to produce high yields and high sugar content are irrigation, drainage, fertilization, and timing of fieldwork to maintain tilth and soil structure.

A typical cropping system is sugar beets rotated every 3 or 4 years with other irrigated row crops. Barley and rye or vetch, or both, are grown as a green manure crop every 3 to 5 years.

Seedbed preparation includes disking and chiseling and occasional plowing, subsoiling, and land planing. The fields are then listed, and seedbeds are shaped. Planting starts late in November and continues through early in April, but most planting is from December through February. The seeding rate generally is 4 to 8 pounds of uncoated seed per acre, but 3 pounds per acre is used in precision planting. The crop is mechanically cultivated, weeded, and thinned as necessary.

Fertilizer is generally applied several times during the season at rates that vary. From 75 to 250 pounds of nitrogen, 50 to 200 pounds of phosphorus, and 20 to 72 pounds of potassium are applied per acre annually. Steer manure can be applied at a rate of 3 to 10 tons per acre prior to the third or fourth crop.

The gross irrigation requirement is about 24 to 30 inches of water per season. Furrow irrigation and sprinklers can be used. Some growers use sprinklers during periods of plant germination and early stages of growth and the furrow method for later stages of growth. Depending on the soil and climate, from 2½ to 7 inches of water is applied every 6 to 28 days during periods of peak water use.

Harvesting generally begins in September and is completed in November, but few harvests begin earlier and extend later. Producers who are unable to dig the beets because of early winter rains harvest the crop in the spring before it sprouts. Sugar content is commonly lower in these beets.

The hazard of erosion is slight to moderate on gently sloping to strongly sloping soils. These soils require more intensive management and care to prevent soil, water, and crop loss. Furrow irrigation should be restricted to slopes of less than 3 percent, and sprinklers should be used on steeper slopes. Cover and green manure crops are needed in the cropping system. Tillage should be across the slope or on the contour.

Sugar beet roots do not penetrate deeply into soils that have a slowly or very slowly permeable subsoil and thus cannot use all of the available water. Frequent light irrigation is used on soils that have a shallow rooting depth. The soil also can become waterlogged if overirrigated.

Sandy or gravelly soils are difficult to irrigate because of the low available water capacity and rapid permeability. Wind damage is a hazard to young plants. Sprinklers should be used exclusively at intervals of 5 to 15 days. Approximately 30 inches of water is applied. The use of fertilizers, manure, green manure crops, and crop residue is needed to maintain organic-matter content. Windbreaks of trees and sunflowers or shrubs, or both, may be needed to prevent damage to young plants and to help control soil blowing on bare fields.

Clay soils are difficult to cultivate without compacting. Timing of fieldwork is critical because these soils tend to be either too wet or too dry to cultivate. Manuring, incorporating crop residues into the soil, vertical mulching, and using green manure crops are important in maintaining tilth and soil structure.

Root growth is restricted in wet soils by a high water table or salts, or both. Subsurface drainage sys-

tems and land leveling or shaping are required to grow sugar beets on these soils. Good management of irrigation water is needed, as well as management to prevent waterlogging, compaction, and serious crop loss.

STRAWBERRIES

Until a recent technical breakthrough in the control of nematodes, strawberries were considered a temporary, one-time crop of 3 to 5 years duration. Now, using new fumagation methods, strawberries can be cropped continuously. During the 6 month harvest season strawberries require a cool climate, and monthly mean temperatures of 60° F are best for production of a quality crop. Strawberries are grown in the northern part of the Salinas and Pajaro Valleys.

Strawberries are grown in nearly level areas of flood plains, alluvial fans, low terraces, and benches and on moderately sloping to steep hills. Strawberries are not suited to clay soils, and the best crops are grown on loam, sand, loamy sand, or sandy loam.

The soil management practices needed to produce high yields of strawberries are management of irrigation water, fertilization, and correct timing of fieldwork.

A typical cropping system is strawberries rotated with high-value row crops common to the area.

Preparing the soil for planting includes plowing or subsoiling, chiseling, disking, leveling, and listing, but not all of these are used on sloping soils. The soil is fumigated before listing. Short, level furrows are constructed on the contour or across the slope. Then late in July or early August, strawberries are planted at the rate of approximately 22,000 transplants per acre on a 2-row, 42-inch bed. Clear polyethylene bed mulching is used to warm the soil, increase early plant growth, control weeds, and reduce the plant decay produced when soil is splashed on plants during rainfall and sprinkler irrigation.

Cultivation is generally limited to 1 or 2 tractor-drawn plowings in spring. Hand cultivation is used to control weeds and trim off runners. Pest control is required to control cyclamen, two-spotted mites, and aphids. If slugs are a problem, pelleted bait is distributed in the furrows.

Fertilizer combinations are applied several times throughout the growing season at rates that average about 100 pounds of nitrogen, 200 pounds of phosphorus, and 200 pounds of potassium per acre.

The gross irrigation requirement is about 3½ to 5 feet of water per acre. Furrow irrigation is used on mature crops, but some sprinkling is done during planting and early growth stages. Water is delivered to level furrows by a gated surface pipe, and the furrows are flooded to a depth of 6 to 8 inches. The frequency of irrigation depends on climate, soils, and type of market. Good managemen^t of irrigation water must be practiced, and irrigations should be closely watched and precisely timed.

The hazard of erosion is slight to moderate on gently sloping to strongly sloping soils. These soils require more intensive management and care than nearly level soils to prevent soil, water, and crop loss. Sprinklers are commonly used during plant establishment, and cross-slope furrow irrigation is used for subsequent irrigations.

Strawberry roots do not readily penetrate soils that have a slowly or very slowly permeable subsoil, and thus cannot fully use all of the available water. These soils require very careful, light, frequent irrigation. If water from irrigation is in excess of the available water capacity, temporary waterlogging and rapid runoff can result.

Sandy or gravelly soils have a low available water capacity and rapid permeability. Sprinklers should be used to establish plants, and furrow irrigations should be used thereafter. Irrigation water is applied every 3 to 5 days throughout the growing season, and a total of 3 to 5 acre feet of water is used. Irrigation furrows are short (less than 100 feet) and on the contour. Furrow capacity is watched constantly, and the duration of water application is precisely timed. Steep soils require very intensive fieldwork and management to produce a crop, because they are not normally suited to cultivation.

Surface land leveling and shaping are needed to grow strawberries on soils that are wet. Good management of irrigation water and fieldwork is necessary to produce a marketable crop.

SMALL WHITE BEANS

Small white beans are grown from the Salinas area south to San Ardo. They are not grown near the coast because of mildew and root rot. Yields fluctuate widely from year to year because of climatic conditions that either favor or restrict mildew and root rot.

Small white beans are grown in nearly level areas of flood plains, alluvial fans, and low terraces and on gently sloping to moderately sloping fans and terraces. White beans do not grow well on salt-affected soils.

The general soil management practices needed to produce high yields of small white beans are careful irrigation, drainage, disease and weed control, fertilization, and prevention of soil compaction.

A typical cropping system is small white beans rotated with other irrigated crops common to the area. Barley and rye or vetch, or both, are grown as a green manure crop every third or fourth year.

Seedbed preparation includes subsoiling, plowing, disking, chiseling, and land planing. Most fields are then listed and shaped for planting. From April through June, 30 to 90 pounds of seed is planted per acre. Most of the acreage is planted in May. The crop is mechanically cultivated and should be weeded once or twice.

Some growers do not apply fertilizer to beans because the beans generally follow a heavily fertilized row crop in the rotation. Other growers apply up to 20 tons of manure every 5 or 6 years and apply 10 to 75 pounds of nitrogen, 25 to 80 pounds of phosphorus, and 30 to 50 pounds of potassium per acre during the growing season.

The gross irrigation requirement is about 15 inches of water. Furrow irrigation or sprinklers can be used. Sprinklers can be used during preplanting and plant emergence. From 2 to 6 inches of irrigation water is applied every 3 to 20 days.

Harvesting is from September through early October during dry weather.

The hazard of erosion is slight to moderate on gently sloping to strongly sloping soils. These soils require

more intensive management and care than nearly level soils to prevent soil, water, and crop loss. Furrow irrigation should be restricted to slopes of less than 3 percent, and sprinklers should be used on steeper slopes. Cover and green manure crops are necessary in the cropping system. Tillage should be across the slope or on the contour.

Small white bean roots do not readily penetrate soils that have a slowly or very slowly permeable subsoil, and thus cannot fully use all of the available water. These soils require more frequent irrigation using small amounts of water. Care must be taken not to overirrigate because if these soils remain wet, root rot seriously reduces yields. These soils use less water during the season because the clayey subsoil prevents water from being lost through deep percolation.

Sandy or gravelly soils are difficult to irrigate because of the low available water capacity and rapid permeability. Sprinklers should be used on these soils, and a large quantity of water is needed. The use of manure, green manure crops, and crop residue is needed to maintain organic-matter content. Windbreaks of trees and sunflowers or shrubs, or both, prevent damage to young plants and help control soil blowing on bare fields.

Clay soils are difficult to cultivate without compacting. Timing of fieldwork is critical because these soils tend to be either too wet or too dry for cultivation. Manuring, incorporating crop residues into the soil, vertical mulching, and using green manure crops are important in maintaining tilth and soil structure.

Subsurface drainage systems and land leveling or shaping are required to grow small white beans on soils that are wet or have a high water table. Good management of irrigation water is needed, as well as management to prevent root rot, mildew, and soil compaction.

BARLEY AND WHEAT (DRYFARMED ONLY)

Barley and wheat are the two crops of economic importance in Land Resource Area 15. They are grown on a wide variety of soils in capability classes III and IV. Barley is also frequently grown as green manure and cover crops on irrigated soils in Resource Area 14. If barley is harvested, it is primarily to reduce competition with succeeding irrigated row crops.[2] Wheat is grown under allotment, and acreage is strictly controlled. In 1971 the wheat allotment for Monterey County was 11,279 acres.

Barley and wheat are mostly grown in dryland valleys and on rolling hills in Land Resource Area 15. The areas east of the Salinas Valley, Long Stringer, Lockwood, Haines, Parkfield, and Peach Tree Valleys are the major grain growing areas. Some grain is grown on the higher terraces and benches above the Salinas Valley floor where irrigation is not feasible. Wheat grows best in the interior Lockwood or Parkfield Valleys. Many growers are replacing wheat with barley because the price difference is narrowing and barley can be grown without regard to allotment quotas.

[2] No attempt is made to estimate yields on irrigated land. Barley is also grown commercially in Resource Area 14 in fringe areas and on valley stringers prior to installation of an irrigation system and full irrigation development. Yields are for dryfarmed barley in those areas.

Dryfarmed grain yields fluctuate widely due to the amount, timing, and pattern of seasonal rainfall.

Barley and wheat are grown on gently rolling plains, alluvial fans, low terraces, and benches in areas of moderately steep slopes.

The general soil management practices needed to produce high yields are fertilization, summer fallowing, and cross-slope fieldwork to prevent soil and water loss. Conserving soil moisture is very critical for planting and maturing the crop. Minimum tillage and correct timing of fieldwork are also very important in producing high yields.

In a typical barley cropping system, the grain is planted in November and harvested in July. Stubble and volunteer grain can be grazed and then fallowed during February and March. Weeds are controlled by tillage through spring and summer. Barley and wheat are often rotated from year to year, and barley is planted on acreages not allowed for wheat under the allotment system.

Seedbed preparation includes plowing or disking, harrowing, and subsoiling or deep chiseling. Seeding is done either by drilling or broadcasting. Planting is commonly from October through January, but the exact planting time generally depends on the first fall rains and the necessity for weed control at the time of seeding. The seeding rate ranges from 60 to 100 pounds per acre, and the average seeding rate is about 90 pounds for barley and 70 pounds for wheat.

Many growers use no fertilizers; others use 20 to 50 pounds of nitrogen and 10 to 40 pounds of phosphorus. Liquid fertilizer is often used. Periods of erratic rainfall can make fertilization questionable.

Weed control can be by ground rigs or aerial spraying or by mechanical means. Selective sprays are used to control wild oat competition. Harvesting commonly begins in June and is completed by the end of August. Harvesting must be done on hot, dry days during periods of low humidity.

Storie Index rating[3]

The Storie Index expresses numerically the relative degree of suitability of a soil for general intensive farming at the time of evaluation. The rating is based on soil characteristics only and is obtained by evaluating such factors as soil depth, texture of the surface layer, density of the subsoil, drainage, amount of salts and alkali, and relief. Other factors, such as availability of water for irrigation, climate, and distance from markets, might determine the desirability of growing certain plants in a given locality but are not considered. The index in itself, therefore, should not be considered as a direct index of land value. Where economic factors are known to the user, however, the Storie Index provides additional objective information for land tract value comparisons.

Four general factors are considered in the index rating. These factors are (A) the characteristics of the soil profile and soil depth, (B) the texture of the surface layer, (C) dominant slope of the soil, and (X) other factors more readily subject to management or modification. In this area the X factors are drainage, salts and alkali, general nutrient level of the soil, and

[3] By GORDON L. HUNTINGTON, lecturer and soil specialist, University of California at Davis.

erosion. Each of these four general factors is evaluated on the basis of 100 percent. A rating of 100 percent expresses the most favorable, or ideal, condition for crop production, and lower ratings are given for conditions that are less favorable.

The index rating for a soil is obtained by multiplying the four factors, A, B, C, and X, and any factor may dominate or control the final rating. For example, a soil may have an excellent permeable profile justifying a rating of 100 percent for factor A, excellent texture of the surface layer justifying 100 percent for factor B, and a smooth, nearly level surface justifying 100 percent for factor C. A slight drainage problem and a high accumulation of salts or alkali, however, justifies a rating of 90 X 20 or 18 percent for factor X. The index rating for this soil is 18. The high accumulation of salts or alkali would dominate the quality of the soil, render it unproductive for crops, and justify the low index rating of 18. In time, however, this soil may be partly or totally reclaimed. At that time the Storie Index should be reevaluated to reflect the changed conditions.

Soils are placed in six grades according to their suitability for general intensive farming as shown by their Storie Index ratings. The index rating for grade 1 is 80 to 100; grade 2, 60 to 80; grade 3, 40 to 60; grade 4, 20 to 40; grade 5, 10 to 20; and grade 6, less than 10. Soils of grade 1 are excellent and well suited to general intensive farming. Grade 2 soils are good and also well suited to farming, but they are less desirable than grade 1 soils. Grade 3 soils are only fairly well suited to farming, grade 4 soils are poorly suited, and grade 5 soils are very poorly suited. Grade 6 consists of soils and land types are are not suited to farming.

Woodland[4]

Commercial logging in Monterey County is limited, but woodland areas provide recreation for many people, food and cover for many forms of wildlife, and protection for watersheds. They also provide outstanding scenic vistas on the Santa Lucia Mountain Range and on the coast.

More than 400,000 acres, or about 20 percent of the county, has scattered stands of mixed conifers and hardwoods. A considerably larger part of the acreage, which has oak and grass or oak brush type vegetation used as range or watershed, is not considered in this section. Most of the wooded areas occur in the Los Padres National Forest, the Ventana Wilderness, or along the coast from Monterey south to the county line. There are about 300,000 acres of woodland in the Los Padres National Forest and about 95,000 acres in the Ventana Wilderness. It is estimated that only 20,000 to 30,000 acres have commercial value, but because of their recreational and environmental value, all of the wooded areas are discussed in this section.

Ponderosa pine and Coulter pine are the principal pine species. Coast redwood is the principal tree in the canyons within the fog belt, extending to the southern limits of the Monterey coast. This tree requires moist growing conditions and foggy summers. Along the Big Sur and Little Sur Rivers, some redwoods are more than 10 feet in diameter. Other conifers in the area are Monterey pine, Douglas-fir, white fir, sugar pine, digger pine, incense cedar, Santa Lucia fir, Monterey cypress, and knobcone pine. The hardwoods mixed with these conifers are California black oak, coast live oak, California white oak, interior live oak, canyon live oak, tanoak, Pacific madrone, California laurel, red alder, bigleaf maple, and sycamore (fig. 10).

Monterey pine and Monterey cypress are on the Monterey peninsula and along the coast to Big Sur. Monterey cypress is native only to this county. Santa Lucia fir, also known as the bristlecone fir (Abies bracteata), occurs naturally only in the Santa Lucia Mountains. It is one of the more rare tree species in this area and has been called the most curious fir tree in the world. It is an ecological relic that is giving way to associated species of oak, madrone, and alder in wet draws and to pine on the higher slopes. Santa Lucia fir generally occurs in scattered pockets in remote locations, such as in the Sur-Junipero complex on Cone Peak Road, just northwest of Cone Peak on a northern exposure (fig. 11).

Stands of ponderosa pine and sugar pine that are more than 6 feet in diameter are near Big Pines, Little Pines, and Junipero Serra Peak. The soils in these areas are mostly Junipero loamy sand, 30 to 50 percent slopes. Black oak, madrone, and laurel are on the northern exposures at higher elevations. Alder, bigleaf maple, and sycamore are along the streams and drainageways.

Timber harvesting in Monterey County is limited mostly to sanitation cutting for controlling forest insects. Because cutting is limited and commercial stands are relatively small and isolated, woodland suitability groups are not given. To assist in establishing or managing woodlands, however, a few mapping units are interpreted for woodland uses. The soils in these mapping units are Gamboa, Junipero, Los Gatos, McMullin, Narlon, Plaskett, Sheridan, and Sur soils.

Site quality is the measure of productivity of the soil for growing trees and is expressed as site index. Site index applies to fully stocked, even-aged unmanaged stands. It is determined by measuring the height and establishing the age of the dominant and co-dominant trees in the stand and relating these to a standard age of 100 years. In this survey, site index values for ponderosa pine are based on Meyers' work (*21*) and for other species, on an equivalent basis. The site index for redwood is determined (*20*) by taking the height at 100 years for their site IV, which is equal to 150 feet at 300 years. This gives a relative rating for all of the interpretations and reflects the rapid early growth of redwood and Douglas-fir in the coastal fog belt. Coulter pine is generally regarded as a noncommercial species and is recommended for plantings on campgrounds or picnic areas.

Ratings of the hazard of erosion indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small; *moderate* if some measures are needed to control erosion during logging and road construction; and *severe* if intensive manage-

[4] KENNETH BRADSHAW, former Regional soil scientist, U.S. Department of Agriculture, Forest Service, and ROBERT A. DELBERG, former State woodland conservationist, Soil Conservation Service, helped write this section.

Figure 10.—Big Sur River drainage area and mixed conifer-hardwood forest in canyons near the coast. Most of the conifers are redwood. Others include Douglas-fir, white fir, yellow pine, and incense cedar. Hardwoods include tanoak, live oak, Pacific madrone, California laurel, and bigleaf maple. The soils are mainly in the Sur-Junipero complex on the upper slopes and Gamboa-Sur complex on the lower slopes and canyon bottoms. This area is in the Ventana Wilderness and is used for hiking and camping.

ment or special equipment and methods are needed to prevent excessive soil loss.

Equipment limitation ratings reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or equipment; *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree to which the soil affects expected mortality of planted tree seedlings when plant competition is not a limiting factor. The ratings are for seedlings from good planting stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that the expected mortality of the planted seedlings is less than 25 percent; *moderate,* 25 to 50 percent; and *severe,* more than 50 percent.

Considered in the ratings of windthrow hazard are characteristics of the soil that affect the development of tree roots and the ability of soil to hold trees firmly. A rating of *slight* indicates that trees in wooded areas are not expected to be blown down by commonly occurring winds; *moderate,* that some trees are blown down during periods of excessive soil wetness and strong winds; and *severe,* that many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

Windbreaks [5]

Windbreaks are established to protect livestock, buildings, and yards from winds and snow. Windbreaks also help protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of both broad-leaved and coniferous species provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field, the interval depending on erodibility

[5] ROBERT A. DELBERG, former State woodland conservationist, helped prepare this section.

Figure 11.—**The slender steeplelike conifers in the foreground are Santa Lucia fir, found only in Monterey County. Most soils in this part of the Ventana Wilderness are in the Cieneba-Sur-Rock outcrop complex and Rock outcrop-Xerorthents association. The notch in the ridge at the left is known as "The Window."**

of the soil. They protect cropland and crops from wind and also provide food and cover for wildlife.

Environmental plantings help to beautify and screen homes and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. Planting healthy stock of suitable species on a well prepared site and maintaining it in good condition insures a high degree of plant survival.

Soil blowing is a problem when soils that have surface layers of sand, loamy sand, and fine sandy loam are bare. These are Metz sand and loamy sand and Psamments and Fluvents, occasionally flooded and frequently flooded. Soil blowing is most serious along the Salinas River in the area from Gonzales to King City, especially after major floods deposit several inches of new soil material. In other areas in the Salinas Valley, windbreaks are most valuable in protecting crops from northwesterly winds during the growing season. The soils in this area are Salinas, Mocho, Cropley, Lockwood, Elder, Arroyo Seco, Rincon, and Oceano soils.

Not only trees and shrubs, but windbreaks of such annuals as sunflowers or corn are used to protect vegetable crops. These plants help to reduce wind damage by reducing soil movement and decreasing the dehydrating effects of hot, dry winds. These annual windbreaks are generally used on clay loam, silty clay loam, and clay soils.

Windbreaks have many uses other than crop protection, such as beautification, farmstead and livestock protection, and the improvement of wildlife habitat.

Farmers report increased crop yields and decreased water requirements on fields protected by windbreaks, especially in summer. Increased yields are due to conservation of moisture, modification of temperature, and protection of seedlings during hot, windy periods. Reduced wind velocity makes for more uniform application of sprinkler water. Fruit and tomato scarring is reduced when fruit is protected by windbreaks. The production of honey is an additional value when flowering trees, such as blue gum, are used in the windbreak.

Windbreaks must be maintained by irrigation, pruning, rejuvenation, and root pruning. Irrigation is usually accomplished by watering the windbreak when the adjacent crop is irrigated. The tops of large trees are pruned to reduce damage from breaking limbs. Cleanup of leaves and bark is sometimes necessary. Rejuvenation is accomplished through timely harvest-

ing or by thicket planting. Roots of large trees in a windbreak are pruned with a heavy subsoiler to reduce their competition with crops.

The windbreak should be planted at right angles to the direction of the damaging wind. Maximum protection is provided by planting the tallest growing suitable tree species. In Monterey County, only one row is planted because of high land values.

Because all windbreaks are irrigated and the climate is mild, a great variety of plants can be used. Commonly used shrubs are tree mallow and tamarix (tetranda). Trees commonly used are blue gum, athel, and Arizona cypress.

Range

About 50 percent of the acreage of Monterey County is suited to range, including some forest land that is grazed. Over half this acreage is made up of Linne, McCoy, Nacimiento, Santa Lucia, Shedd, Sheridan, and Vista soils. Alo, Climara, Diablo, Los Osos, and San Benito soils are other important soils used for range. All of these soils are on uplands at elevations of 20 to 5,800 feet. Generally the soils used for range are too steep, shallow, or rocky for cultivated crops. Significant acreages formerly used for production of grain and hay are now used for grazing. Fairly large acreages along stream channels and stony ridgetops within timbered areas also have value for grazing. Some areas have been cleared of brush or trees and are used for forage production.

Where climate and topography do not vary, differences in the kind and amount of vegetation that range can produce are related closely to the kind of soil. Effective management is based on the relationships of soils, vegetation, and water.

Range that has a high potential for forage is clay loam or clay, is neutral to moderately alkaline, and is calcareous in places. The available water capacity ranges from 5 to 12 inches. The soils are typically 24 to 40 inches deep to sandstone or shale, or both. Examples in Monterey County are Alo, Climara, Diablo, Linne, and Nacimiento soils.

Range that has a low potential for forage generally is sand, loamy sand, sandy loam, or loam but may be gravelly or shaly, such as Gaviota or Lopez soils. The available water capacity ranges from 1 to 3 inches. The depth to bedrock is less than 20 inches in places.

Some clay loams have low or very low fertility because of a high magnesium-low calcium ratio. The available water capacity is 1 to 3 inches. The soils generally are 10 to 20 inches deep over serpentine bedrock and contain numerous stones. Examples are Henneke or Montara soils.

The soils used for range in Monterey County have been grouped by range sites. A range site supports a distinctive potential plant community, or combination of plants, that can grow on a site that has not undergone major disturbance. Soils that produce the same kind, amount, and proportion of range plants are grouped into a range site. Range sites can be interpreted directly from the soil map, where the relationships between soils and vegetation have been correlated. Soil properties that determine the capacity of the soil to supply moisture and plant nutrients have the greatest influence on range plants and their productivity. Reaction, salt content, and a seasonal high water table are also important.

Potential production refers to the amount of herbage that can be expected to grow on well managed range that is supporting the potential plant community. It is expressed in pounds per acre of air-dry herbage for favorable, normal, and unfavorable years. A favorable year is one in which the amount and distribution of precipitation and the temperatures result in growing conditions substantially better than average; a normal year is one in which these conditions are about average for the area; and an unfavorable year is one in which growing conditions are well below average, generally because of low available soil moisture. Both precipitation and temperature influence total annual production; ample rainfall may occur, but temperatures may be too low for optimum growth.

Common names are listed for the grasses, forbs, and shrubs that make up most of the potential plant community on each soil. The proportion of each kind of plant, is given as a percentage, in dry weight, of the total annual production of herbaceous and woody plants. The amount that can be used as forage depends on the kinds of grazing animals and on the season when the forage is grazed. All of the herbage produced is normally not used.

Dry weight refers to the total air-dry herbage produced per acre each year by the potential plant community. All herbage, both that which is highly palatable to livestock and that which is unpalatable, is included. Some of the herbage also is grazed by wildlife.

Range management requires, in addition to knowledge of the kind of soil and the potential plant community, an evaluation of the present condition of the range vegetation in relation to its potential production. Range condition is an expression of how the present plant community compares with the potential plant community on a particular kind of soil and range site. The more alike the present and the potential plant communities, the better the range condition. The common objective in range management is to manage grazing so that the plants growing on a site are about the same in kind and amount as the potential native plant community for that site. Such management generally results in the maximum production of herbage, conservation of water, and control of erosion. Sometimes, however, a range condition somewhat below the potential fits grazing needs, provides wildlife habitat, or provides other benefits, such as protecting soil and water resources.

The major management concern on most of the range is control of grazing so that the kinds and amounts of plants that make up the potential plant community are re-established. Controlling brush and minimizing soil blowing are also important management concerns. If sound range management based on the soil survey information and rangeland inventories is applied, the potential is good for increasing the productivity of range in the area.

Range sites may be divided into phases on the basis of differences in slope which require adjustment in management. The steep phase of each site has slopes of 30 to 50 percent, and the very steep phase has slopes of over 50 percent. The total production poten-

tial on these phases is essentially the same as on slopes of less than 30 percent, but it is necessary to keep greater residues on the surface to reduce runoff because the erosion hazard increases with an increase in slope.

Where soils are mapped in a complex of two or more soils, the range sites are also in complex unless all soil components in the complex occur in the same range site. Where the soils are different enough to be in two range sites, the range site description applies that includes each soil component in the complex.

Soils in Monterey County have been grouped into 11 range sites. The following range site descriptions include a brief description of the group of soils that make up a site; a listing of the important desirable, less desirable, and undesirable forage plants; the acreage and general location of the sites as they occur in the county; and estimated production potential.

CLAYEY RANGE SITE

This is one of the better producing range sites in Monterey County. It covers about 335,000 acres throughout the county. The elevation ranges from 40 to 3,500 feet. The average annual rainfall ranges from 10 to 30 inches. The topography is gently rolling to very steep, and slopes range from 2 to 75 percent. About 45 percent of the acreage is steep and 25 percent is very steep.

The soils in this site are well drained clay, silty clay, and silty clay loam. Reaction ranges from medium acid to moderately alkaline. Most of the soils have lime in the subsoil, and some have it throughout the profile. Permeability in the subsoil is slow to moderately slow, and runoff is medium to very rapid. Roots can penetrate to a depth of 20 to 60 inches. The available water capacity is 3 to 12 inches. Few rock outcrops occur.

This site has a cover of grass and little or no brush and few or no oaks. When this site is in excellent condition, about 70 percent of the herbage is a mixture of soft chess, remnant perennial grasses, filaree, annual clovers, and excellent stands of bur clover and wild oats. About 20 percent of the herbage is ripgut brome, wild barley, annual fescue, red brome, wild carrot, annual lupine, and other less desirable plants. The rest is nitgrass, tarweed, fiddleneck, vinegarweed, turkey mullein, thistles, mustard, and other undesirable plants. Along the coast, ryegrass is an important part of the cover.

The soils in this site that have slopes of less than 50 percent are well suited to seeding of the adapted annual grasses and legumes. Where the average annual rainfall is more than 16 inches and where a good seedbed can be prepared mechanically, hardinggrass and perlagrass grow well. Forage plants on these soils respond well to nitrogen and phosphorus fertilizers.

This site is in three precipitation zones. In the zone that receives 10 to 16 inches of precipitation a year, this site can produce 2,000 pounds per acre of air-dry herbage in favorable years and 800 pounds per acre in unfavorable years. Where it receives 16 to 20 inches of precipitation a year, the site can produce 3,000 pounds per acre of air-dry herbage in favorable years and 1,600 pounds in unfavorable years. Where it receives 20 inches or more of precipitation a year, the site can produce 4,000 pounds per acre of air-dry herbage in favorable years and 2,400 pounds in unfavorable years.

Because this site has no brush or oaks when producing at full potential, the total herbage production is available feed for livestock and wildlife. The total amount, however, must not be used for forage. Enough residue should be left on the soils to protect the site against deterioration.

FINE LOAMY RANGE SITE

This is one of the highest producing range sites in Monterey County. It covers about 107,000 acres throughout the county. The elevation ranges from 50 to 3,500 feet. The average rainfall ranges from 12 to 35 inches. The topography is gently rolling to steep, and slopes range from 9 to 75 percent. About 55 percent of the acreage is steep and 25 percent is very steep.

The soils in this site are well drained fine sandy loam, silt loam, and clay loam. Reaction ranges from slightly acid to neutral in the surface layer and from slightly acid to moderately alkaline in the subsoil. Permeability is slow to moderate, and runoff is slow to very rapid. Roots can penetrate to a depth of 24 to 60 inches. The available water capacity is 4 to 10 inches.

This site has a cover of annual grasses, wild oats, forbs, shrubs, and oaks. When this site is in excellent condition, about 70 percent of the herbage is a mixture of soft chess, remnant perennial grasses, filaree, annual clovers, and good stands of bur clover and wild oats. About 20 percent is ripgut brome, wild barley, annual fescue, red brome, wild carrot, annual lupine, and other less desirable plants. The rest is nitgrass, tarweed, fiddleneck, vinegarweed, turkey mullein, thistles, mustard, and other undesirable plants. Along the coast, ryegrass is an important part of the cover.

The soils in this site that have slopes of less than 50 percent are well suited to seeding of the adapted annual grasses and legumes. Where the average annual rainfall is more than 16 inches and where a good seedbed can be prepared mechanically on slopes of less than 30 percent, hardinggrass and perlagrass grow well. Forage plants on the soils in this site respond well to nitrogen and phosphorus fertilizers.

This site is in three precipitation zones. In the zone that receives 12 to 16 inches of precipitation a year, this site can produce 1,800 pounds per acre of air-dry herbage in favorable years and 800 pounds per acre in unfavorable years. Where it receives 16 to 20 inches of precipitation a year, the site can produce 2,800 pounds per acre of air-dry herbage in favorable years and 1,500 pounds in unfavorable years. Where it receives 20 inches or more of precipitation a year, the site can produce 3,500 pounds per acre of air-dry herbage in favorable years and 2,000 pounds in unfavorable years.

Because this site has only open to scattered stands of brush or oak when producing at full potential, at least 90 percent of the total herbage production is available feed for livestock and wildlife. The total amount, however, must not be used for forage. Enough residue should be left on the soils to protect the site against deterioration.

GRANITIC CLAY RANGE SITE

This range site is one of high production. It covers

about 35,000 acres. The elevation ranges from 400 to 2,900 feet. The mean annual precipitation is 12 to 25 inches. The soils are moderately steep to very steep, and slopes are 15 to 75 percent. About 50 percent of the acreage is steep and 40 percent is very steep.

The soils in this site are well drained clay loam. Reaction ranges from slightly acid in the surface layer to mildly alkaline in the subsoil. Permeability is moderately slow, and runoff is medium to very rapid. Roots can penetrate to a depth of 20 to 40 inches. The available water capacity is 5 to 8 inches.

This site has a cover of annual grasses, forbs, and brush and a few scattered oaks. When this site is in excellent condition, about 70 percent of the herbage is a mixture of soft chess, remnant perennial grasses, filaree, annual clovers, wild oats, and bur clover. About 20 percent is ripgut brome, wild barley, annual fescue, red brome, wild carrot, annual lupine, and other less desirable plants. The rest is nitgrass, tarweed, fiddleneck, vinegarweed, turkey mullein, thistle, mustard, and other undesirable plants.

The soils in this site that have slopes of less than 50 percent are suited to seeding of the adapted annual grasses and legumes. They respond well to nitrogen and phosphorus fertilizers.

This site is in three precipitation zones. In the zone that receives 12 to 16 inches of precipitation a year, this site can produce 1,800 pounds per acre of air-dry herbage in favorable years and 800 pounds per acre in unfavorable years. Where it receives 16 to 20 inches of precipitation a year, the site can produce 2,500 pounds per acre of air-dry herbage in favorable years and 1,500 pounds in unfavorable years. Where it receives 20 inches or more of precipitation a year, the site can produce 3,500 pounds per acre of air-dry herbage in favorable years and 2,000 pounds in unfavorable years.

Because this site has only open to scattered stands of brush and oaks when producing at full potential, 85 percent of the total herbage production is available feed for livestock and wildlife. The total amount, however, must not be used for forage. Enough residue should be left on the soils to protect the site against deterioration.

LOAMY RANGE SITE

This range site is one of high production. It covers about 213,000 acres in the western part of the county. The elevation ranges from 300 to 3,200 feet. The average annual rainfall ranges from 10 to 40 inches. The topography is gently sloping to very steep, and slopes range from 2 to 75 percent. About 20 percent of the acreage is steep and 70 percent is very steep.

The soils in this site are well drained sandy loam, silt loam, gravelly loam, and shaly clay loam. Reaction ranges from strongly acid to moderately alkaline in both the surface layer and subsoil. Permeability in the subsoil is slow to moderate, and runoff is medium to very rapid. On uplands, roots can penetrate to a depth of 20 to 40 inches, and the available water capacity is 2 to 8 inches. On terraces, roots can penetrate to a depth of more than 60 inches, and the available water capacity is 7 to 10 inches.

This site has a cover of annual grasses, oaks, and brush. When this site is in excellent condition, about 70 percent of the herbage is a mixture of soft chess, remnant perennial grasses, filaree, annual clovers, and wild oats. About 20 percent is ripgut brome, wild barley, annual fescue, red brome, wild carrot, annual lupine, and other less desirable plants. The rest is nitgrass, tarweed, fiddleneck, vinegarweed, turkey mullein, thistles, mustard, and other undesirable plants.

The soils in this site that have slopes of less than 50 percent are suited to seeding of the adapted annual grasses and legumes. Forage plants on these soils respond well to nitrogen and phosphorus fertilizers.

This site is in three precipitation zones. In the zone that receives 10 to 16 inches of precipitation a year, this site can produce 2,000 pounds per acre of air-dry herbage in favorable years and 800 pounds per acre in unfavorable years. Where it receives 16 to 20 inches of precipitation a year, the site can produce 2,500 pounds per acre of air-dry herbage in favorable years and 1,500 pounds in unfavorable years. Where it receives 20 inches or more of precipitation a year, the site can produce 3,000 pounds per acre of air-dry herbage in favorable years and 1,800 pounds in unfavorable years.

Because this site has no brush or oaks when producing at full potential, the total herbage production is available feed for livestock and wildlife. The total amount, however, must not be used for forage. Enough residue should be left on the soils to protect the site against deterioration.

CLAYPAN RANGE SITE

This is not an important range site in Monterey County because most of the acreage is farmed and has been subdivided. It covers about 80,000 acres. The elevation ranges from 20 to 2,000 feet. The average rainfall ranges from 10 to 25 inches. The topography is nearly level to strongly rolling, and slopes range from 0 to 30 percent.

The soils in this site are somewhat poorly drained to well drained loamy fine sand, loam, coarse sandy loam, fine sandy loam, very fine sandy loam, and sandy loam. Reaction ranges from strongly acid to neutral in the surface layer and from very strongly acid to moderately alkaline in the subsoil. Permeability in the subsoil is slow or very slow, and runoff is very slow to rapid. Roots can penetrate to a depth of 8 to 30 inches. The available water capacity is 1 inch to 5.5 inches, and part of this moisture is held in the claypan and is very slowly available to plants.

This site has a cover of annual grasses and forbs and some scattered oaks. When this site is in excellent condition, about 70 percent of the herbage is a mixture of soft chess, remnant perennial grasses, filaree, annual clovers, and annual trefoils. About 20 percent is ripgut brome, wild barley, annual fescue, red brome, wild carrot, annual lupine, and other less desirable plants. The rest is nitgrass, tarweed, fiddleneck, vinegarweed, turkey mullein, thistles, mustard, and other undesirable plants (fig. 12).

The soils in this site are well suited to seeding of the adapted annual grasses and legumes. In most areas a good seedbed can be prepared mechanically, and blando brome and lana vetch grow well. Forage plants on these soils respond well to nitrogen and phosphorous fertilizers.

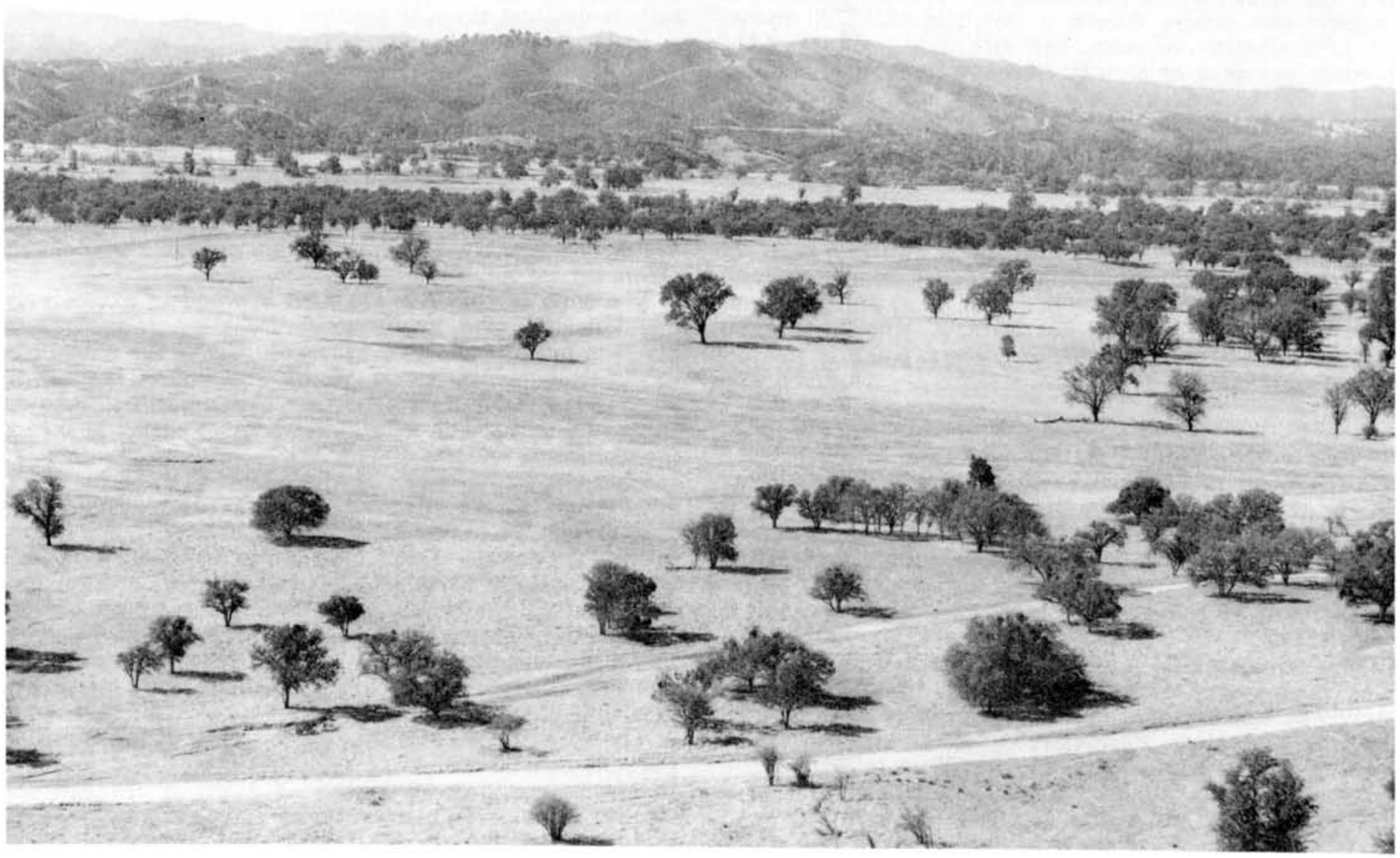

Figure 12.—Oak-savanna vegetation is common in the Jolon and Lockwood Valleys. Claypan range site is in the foreground, and Loamy range site is on the low foothills. Pinnacles coarse sandy loam, very gravelly subsoil variant, is in the foreground. Placentia sandy loam, 2 to 9 percent slopes, is in the center. The dense oak bank running across the upper middle is in an area of Arroyo Seco gravelly sandy loam, 0 to 2 percent slopes. The low hills are in areas of Santa Lucia, Reliz, and Lopez soils.

This site is in two precipitation zones. In the zone that receives 10 to 16 inches of precipitation a year, this site can produce 1,500 pounds per acre of air-dry herbage in favorable years and 700 pounds per acre in unfavorable years. Where it receives 16 inches or more of precipitation a year, the site can produce 2,500 pounds per acre of air-dry herbage in favorable years and 1,400 pounds in unfavorable years.

Because this site has few oaks when producing at full potential, almost all the herbage production is available feed for livestock and wildlife. The total amount, however, must not be used for forage. Enough residue should be left on the soils to protect the site against deterioration.

GRANITIC RANGE SITE

This range site is one of moderate production. It covers about 183,000 acres in two mountain ranges. The elevation ranges from 200 to 5,800 feet. The average annual rainfall ranges from 12 to 80 inches. The topography is hilly to very steep, and slopes range from 5 to 75 percent. About 80 percent of the acreage is very steep. Some areas can be eroded, and when this occurs the potential production is greatly reduced.

The soils in this site are well drained sandy loam, coarse sandy loam, and gravelly loam. Rock outcrops are in some areas. Reaction ranges from medium acid to neutral. Permeability is moderate to moderately rapid, and runoff is medium to very rapid. Roots penetrate to a depth of 20 to 40 inches. The available water capacity is 2 to 6 inches.

This site has a cover of annual grasses, oaks, madrones, pines, and brush. When this site is in excellent condition, about 70 percent of the herbage is a mixture of soft chess, remnant perennial grasses, filaree, annual clovers, and wild oats. About 20 percent is ripgut brome, wild barley, annual fescue, red brome, wild carrot, annual lupine, and other less desirable plants. The rest is nitgrass, fiddleneck, popcornflower, vinegarweed, turkey mullein, and other undesirable plants.

The soils in this site that have slopes of less than 30 percent are suited to seeding of selected annual grasses and legumes. They respond well to nitrogen and phosphorus fertilizers.

This site is in three precipitation zones. In the zone that receives 12 to 16 inches of precipitation a year, this site can produce 1,700 pounds per acre of air-dry herbage in favorable years and 800 pounds per acre in unfavorable years. Where it receives 16 to 20 inches of precipitation a year, the site can produce 2,100 pounds per acre of air-dry herbage in favorable years and 1,000 pounds in unfavorable years. Where it receives 20 inches or more of precipitation a year, the site can produce 2,500 pounds per acre of air-dry herbage in favorable years and 1,500 pounds in unfavorable years.

Because this site has only open to scattered stands of brush or oaks when producing at full potential, 85 percent of the total herbage production is available feed for livestock and wildlife. The total amount, however, must not be used for forage. Enough residue should be left on the soils to protect the site against deterioration.

COARSE LOAMY RANGE SITE

This range site is one of moderate production. It covers about 55,000 acres in the central and southern parts of the county. The elevation ranges from 50 to 3,500 feet. The average annual rainfall ranges from 10 to 55 inches. The topography is undulating to very steep, and slopes range from 2 to 75 percent. About 30 percent of the acreage is steep and 30 percent is very steep.

The soils in this site are well drained sandy loam, fine sandy loam, gravelly loam, and stony loam. Rock outcrops are in some areas. Reaction is medium acid to mildly alkaline. Permeability in the subsoil is slow to moderately rapid. Runoff is medium to very rapid. Roots can penetrate to a depth of 20 to 60 inches or more. The available water capacity is 2 to 8 inches.

This site has a cover of annual grasses and a few oaks and some brush. When this site is in excellent condition, about 70 percent of the herbage is a mixture of soft chess, remnant perennial grasses, filaree, annual clovers, and wild oats. About 20 percent is ripgut brome, wild barley, annual fescue, red brome, annual lupine, and other less desirable plants. The rest is nitgrass, fiddleneck, popcornflower, vinegarweed, turkey mullein, and other undesirable plants.

The soils in this site that have slopes of less than 30 percent are suited to seeding of the adapted annual grasses and legumes, including lana vetch which spreads through animal droppings. In areas receiving more than 12 inches of rainfall annually, the forage plants respond well to nitrogen and phosphorus fertilizers.

This site is in three precipitation zones. In the zone that receives 10 to 16 inches of precipitation a year, this site can produce 1,600 pounds per acre of air-dry herbage in favorable years and 800 pounds per acre in unfavorable years. Where it receives 16 to 20 inches of precipitation a year, the site can produce 2,000 pounds per acre of air-dry herbage in favorable years and 1,000 pounds in unfavorable years. Where it receives 20 inches or more of precipitation a year, the site can produce 2,400 pounds per acre of air-dry herbage in favorable years and 1,200 in unfavorable years.

Because brush or oaks are on this site when it is producing at full potential, 85 to 90 percent of the total herbage production is available feed for livestock and wildlife. The total amount, however, must not be used for forage. Enough residue should be left on the soils to protect the site against deterioration.

SANDY RANGE SITE

This range site is one of moderate production. It covers about 78,000 acres in the northern part of the county. The elevation ranges from 20 to 5,800 feet. The average annual rainfall ranges from 10 to 80 inches. The topography is undulating to steep, and slopes range from 2 to 50 percent. About 40 percent of the acreage is gently sloping to hilly and 60 percent is steep.

The soils in this site are well drained to excessively drained sand and loamy sand. Reaction ranges from medium acid to neutral. Permeability in the subsoil is moderately rapid to very rapid, and runoff is slow to very rapid. Roots can penetrate to a depth of 20 to 60 inches or more. The available water capacity is 2 to 6 inches.

This site has a cover of annual grasses, forbs, oaks, eucalyptus, manzanita, and chamise and some brush and trees. When this site is in excellent condition, about 70 percent of the herbage is a mixture of soft chess, remnant perennial grasses, filaree, annual clovers, and wild oats. About 20 percent is ripgut brome, wild barley, annual fescue, red brome, annual lupine, and other less desirable plants. The rest is nitgrass, fiddleneck, vinegarweed, turkey mullein, and other undesirable plants.

The soils in this site that have slopes of less than 30 percent can be seeded to annual grasses and legumes in areas receiving 16 inches or more of rainfall annually. Forage plants on these soils respond well to nitrogen and phosphorus fertilizers.

This site is in three precipitation zones. In the zone that receives 10 to 16 inches of precipitation a year, this site can produce 1,500 pounds per acre of air-dry herbage in favorable years and 800 pounds per acre in unfavorable years. Where it receives 16 to 20 inches of precipitation a year, the site can produce 1,800 pounds per acre of air-dry herbage in favorable years and 1,000 pounds in unfavorable years. Where it receives 20 inches or more of precipitation a year, the site can produce 2,200 pounds per acre of air-dry herbage in favorable years and 1,200 pounds in unfavorable years.

Because brush or trees are on this site when it is producing at full potential, 75 to 80 percent of the total herbage production is available feed for livestock and wildlife. The total amount, however, must not be used for forage. Enough residue should be left on the soils to protect the site against deterioration.

TERRACE RANGE SITE

This range site is one of moderate production. It covers about 23,000 acres. The elevation is 500 to 1,500 feet. The average annual rainfall ranges from 12 to 18 inches. The soils are strongly sloping to steep, and slopes are 9 to 50 percent. About 30 percent of the acreage is steep.

The soils in this site are well drained shaly loam. Reaction is medium acid to very strongly acid. Perme-

ability in the subsoil is moderately slow, and runoff is medium to rapid. Roots can penetrate to a depth of more than 60 inches. The available water capacity is 4 to 6 inches.

This site has a cover of annual grasses and scattered oaks. When this site is in excellent condition, about 70 percent of the herbage is a mixture of soft chess, remnant perennial grasses, filaree, annual clovers, and excellent stands of wild oats. About 20 percent is ripgut brome, wild barley, annual fescue, red brome, annual lupine, and other less desirable plants. The rest is nitgrass, tarweed, fiddleneck, vinegarweed, turkey mullein, and other undesirable plants.

The soils in this site are suited to seeding of the adapted annual grasses and legumes. They respond well to nitrogen and phosphorus fertilizers.

This site is in only one precipitation zone. It is in a zone that receives 12 to 18 inches of precipitation a year, and can produce 2,000 pounds per acre of air-dry herbage in favorable years and 800 pounds per acre in unfavorable years.

Because this site has some oaks when producing at full potential, about 90 percent of the total herbage production is available feed for livestock and wildlife. The total amount, however, must not be used for forage. Enough residue should be left on the soils to protect the soils and vegetation from deterioration.

SHALLOW LOAMY RANGE SITE

This range site is one of moderate production. It covers about 215,000 acres. The elevation ranges from 450 to 5,000 feet. The average annual rainfall ranges from 10 to 55 inches. The topography is moderately steep to very steep, and slopes range mainly from 30 to 75 percent. About 65 percent of the acreage is steep and 35 percent is very steep.

The soils in this site are excessively drained to well drained sandy loam, loam, or clay loam that is gravelly or shaly in most places. Rock outcrops are common in this site. Reaction is medium acid to neutral. Permeability in the subsoil is moderately rapid to moderate, and runoff is medium to very rapid. Roots can penetrate to a depth of 7 to 20 inches. The available water capacity is 1 to 3 inches.

This site has a cover of annual grasses and scattered oaks and digger pines. When this site is in excellent condition, about 70 percent of the herbage is a mixture of soft chess, remnant perennial grasses, annual clovers, filaree, and wild oats. About 20 percent is ripgut brome, wild barley, annual fescue, red brome, wild carrot, annual lupine, and other less desirable plants. The rest is nitgrass, fiddleneck, vinegarweed, turkey mullein, and other undesirable plants.

The soils in this site are not well suited to seeding because of the shallow soil depth and the low available water capacity.

This site is in two precipitation zones. In the zone that receives 10 to 20 inches of precipitation a year, this site can produce 1,200 pounds per acre of air-dry herbage in favorable years and 700 pounds per acre in unfavorable years. Where it receives 20 inches or more of precipitation a year, the site can produce 1,800 pounds per acre of air-dry herbage in favorable years and 1,000 pounds in unfavorable years.

Because this site has only open to scattered stands of brush or oaks when producing at full potential, 85 percent of the total herbage production is available feed for livestock and wildlife. The total amount, however, must not be used for forage. Enough residue should be left on the soils to protect the site against deterioration.

SERPENTINE RANGE SITE

This is the lowest producing range site in Monterey County. It covers about 26,000 acres. The elevation ranges from 500 to 3,000 feet. The average annual rainfall ranges from 10 to 45 inches. The topography is gently rolling to very steep, and slopes range from 5 to 75 percent.

The soils in this site are well drained and excessively drained clay loam and extremely stony clay loam. Rock outcrops are in some areas. Reaction ranges from neutral to mildly alkaline. Permeability in the subsoil is moderately slow, and runoff is medium to very rapid. Roots can penetrate to a depth of 10 to 20 inches. The available water capacity is 1 to 3 inches.

This site has a cover of annual grasses and filaree and such brush and trees as chamise, manzanita, yerba santa, toyon, deer brush, digger pine, live oak, and blue oak. When this site is in excellent condition, about 50 percent of the herbage is a mixture of soft chess, remnant perennial grasses, filaree, annual clovers, and spanish clover. About 35 percent is red brome, annual lupine, wild carrot, and large amounts of annual fescue. The rest is owl clover, goldfield, brodiaea, vinegarweed, nitgrass, and silver hairgrass.

The soils in this site are not suited to seeding because of a dominant slope of 45 percent or more, an unfavorable calcium/magnesium ratio, and very low fertility.

This site is in two precipitation zones. In the zone that receives 10 to 16 inches of precipitation a year, this site can produce 1,200 pounds per acre of air-dry herbage in favorable years and 500 pounds per acre in unfavorable years. Where it receives 16 inches or more of precipitation a year, the site can produce 1,500 pounds per acre of air-dry herbage in favorable years and 600 pounds in unfavorable years.

The total herbage production must not be used for forage. Enough residue should be left on the soils to protect the site against deterioration.

SHALLOW COARSE LOAMY RANGE SITE

This range site is one of moderately low production. It covers about 25,000 acres. The elevation ranges from 1,000 to 3,500 feet. The average annual rainfall ranges from 15 to 35 inches. The topography is moderately steep to very steep, and slopes range from 15 to 75 percent. About 65 percent of the acreage is steep and very steep.

The soils in this site are somewhat excessively drained sandy loam. Rock outcrops are in some areas. Reaction ranges from medium acid to neutral. Permeability in the subsoil is moderately rapid, and runoff is rapid to very rapid. Roots can penetrate to a depth of 10 to 20 inches. The available water capacity is 1 to 3 inches.

This site has a cover of annual grasses, forbs, oaks, pines, and brush. When this site is in excellent condition, about 70 percent of the herbage is a mixture of

soft chess, filaree, annual clovers, and wild oats. About 20 percent is ripgut brome, wild barley, annual fescue, red brome, wild carrot, annual lupine, and other less desirable plants. The rest is nitgrass, popcornflower, vinegarweed, turkey mullein, and other undesirable plants.

The soils in this site are not suited to seeding or fertilization because of the shallow soil depth, steep slopes, and low available water capacity.

This site is in two precipitation zones. In the zone that receives 15 to 20 inches of precipitation a year, this site can produce 1,000 pounds per acre of air-dry herbage in favorable years and 600 pounds per acre in unfavorable years. Where it receives 20 inches or more of precipitation a year, the site can produce 1,400 pounds per acre of air-dry herbage in favorable years and 800 pounds in unfavorable years.

When producing at potential, this site has an open to scattered stand of brush or trees, and 85 percent of the total herbage is available feed for livestock and wildlife. The total amount, however, must not be used for forage. Enough residue should be left on the soils to protect the site against deterioration.

Wildlife

Wildlife is important in Monterey County. Some kinds of wildlife in the area are Columbian black-tailed deer, California mule deer, jackrabbits, ground squirrels, coyotes, mountain lions, meadowlarks, quail, mourning doves, white-tailed kite, and many other birds. Trout are in cold streams. Coastal streams support some steelhead and a few silver salmon. Bass, bluegill, and some channel catfish have been planted in local ponds and reservoirs. Many striped bass, black bass, and various sunfish, catfish, and other fish are in the San Antonio Reservoir.

The quality of wildlife habitat depends on the soil, water, and landscape of the area.

The soils directly affect the kind and amount of vegetation that is available to wildlife as food and cover, and they affect the development of water impoundments. The kind and abundance of wildlife that populate an area depend largely on the amount and distribution of food, cover, and water. If any one of these elements is missing, inadequate, or inaccessible, wildlife will either be scarce or will not inhabit the area. Wildlife habitat decreases as farming and urban areas are developed.

If the soils have the potential, wildlife habitat can be created or improved by planting appropriate vegetation, by properly managing the existing plant cover, and by fostering the natural establishment of desirable plants.

In table 4 the soils in the survey area are rated according to their potential to support the main kinds of wildlife habitat in the area. This information can be used in—

1. Planning the use of parks, wildlife refuges, nature study areas, and other developments for wildlife.
2. Selecting soils that are suitable for creating, improving, or maintaining specific elements of wildlife habitat.
3. Determining the intensity of management needed for each element of the habitat.
4. Determining areas that are suitable for acquisition to manage for wildlife habitat.

The potential of the soil for wildlife habitat is rated good, fair, poor, or very poor. A rating of *good* means that the element or kind of wildlife habitat is easily created, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected if the soil is used for the designated purpose. A rating of *fair* means that the element or kind of wildlife habitat can be created, improved, or maintained in most places. Moderate intensity of management and fairly frequent attention are required for satisfactory results. A rating of *poor* means that limitations are severe for the designated element or kind of wildlife habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and requires intensive effort. A rating of *very poor* means that restrictions for the elements or kind of wildlife habitat are very severe and that unsatisfactory results can be expected. Wildlife habitat is impractical or even impossible to create, improve, or maintain on soils having such a rating.

The elements of wildlife habitat are briefly described in the following paragraphs.

Grain and seed crops are seed-producing annuals used by wildlife. Examples are corn, sorghum, wheat, safflower, oats, barley, millet, buckwheat, cowpeas, soybeans, and sunflowers. The major soil properties that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are planted for wildlife food and cover. Examples are fescue, bluegrass, lovegrass, switchgrass, bromegrass, timothy, Hardinggrass, orchardgrass, clover, alfalfa, trefoil, and lana vetch. Major soil properties that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations.

Wild herbaceous plants are native or naturally established herbaceous grasses and forbs, including weeds, that provide food and cover for wildlife. Examples are bur clover, filaree, wild oats, vetch, and wild mustard. Major soil properties that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations.

Hardwood trees and the associated woody understory provide cover for wildlife and produce nuts or other fruit, buds, catkins, twigs, bark, or foliage that wildlife eat. Examples of native plants are oak, madrone, and myrtle. Examples of fruit-producing shrubs that are commercially available and suitable for planting on soils rated good are Russian-olive, autumn-olive, and crabapple. Major soil properties that affect growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness.

Coniferous plants are cone-bearing trees, shrubs, or ground cover that furnish habitat or supply food in the form of browse, seeds, or fruitlike cones. Examples are redwoods, ponderosa pine, incense cedar, and Monterey pine. Major soil properties that affect the growth of coniferous plants are depth of the root zone, available water capacity, and wetness.

Shrubs are bushy woody plants that produce fruits, buds, twigs, bark, or foliage that are used by wildlife or that provide cover and shade for some species of wildlife. Examples are blackberry, buckbrush, chamise, manzanita, wild rose, oats, quailbush, and toyon. Major soil properties that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and moisture.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites, exclusive of submerged or floating aquatics. They produce food or cover for wildlife that use wetlands as habitat. Examples of wetland plants are alkali bulrush, fathen, watergrass, wheat, pickleweed, smartweed, wild millet, rushes, sedges, reeds, wildrice, saltgrass, cordgrass, and cattail. Major soil properties affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness.

Shallow water areas are bodies of surface water that have an average depth of less than 5 feet and are useful to wildlife. They can be naturally wet areas, or they can be created by dams or levees or by water-control devices in marshes or streams. Examples are muskrat marshes, waterfowl feeding areas, wildlife watering developments, beaver ponds, and other wildlife ponds. Major soil properties affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. The availability of a dependable water supply is important if water areas are to be developed.

The kinds of wildlife habitat are briefly described in the following paragraphs.

Openland habitat consists of croplands, pastures, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. About 15 percent of the acreage of the county is suited to openland wildlife. The kinds of wildlife attracted to these areas included bobwhite quail, pheasant, meadowlark, field sparrow, killdeer, rabbit, red fox, woodchuck, California quail, deer, ground squirrel, and whitetailed kites.

Woodland habitat consists of hardwoods or conifers or a mixture of both, and associated grasses, legumes, and wild herbaceous plants. About 5 percent of the acreage is suited to woodland wildlife. Examples of wildlife attracted to this habitat are wild turkey, ruffed grouse, woodcock, thrushes, vireos, woodpeckers, tree squirrels, grey fox, raccoon, elk, black bear, black-tailed deer, California mule deer, mountain lion, band-tailed pigeon, mountain quail, and blue grouse.

Wetland habitat consists of water-tolerant plants in open, marshy, or swampy shallow water areas. About 1 percent of the acreage is made up of wetland habitat. Examples of wildlife attracted to this habitat are coots, ducks, geese, herons, shore birds, rails, kingfishers, muskrat, mink, and beaver. Most of the wetland habitat is coastal saltmarsh at Elkhorn slough.

Rangeland habitat consists of wild herbaceous plants and shrubs on range. About 78 percent of the acreage is made up of range plants. Examples of wildlife attracted to this habitat are antelope, white-tailed deer, desert muledeer, buffalo, javelina, chukar, scaled quail, sage grouse, meadowlark, lark bunting, Columbian black-tailed deer, California mule deer, coyote, ground squirrel, jackrabbit, California quail, and redtailed hawk.

Recreation

Outdoor recreation is increasingly important in Monterey County. The 326,647 acres within the Los Padres National Forest is used intensively for recreation. More than 1,400,000 visitors used approximately 77 campsites in the Ventana Wilderness area annually. An extensive State park system is along 80 miles or so of coastline.

The Forest Service is developing a land use system for campsites, trails, and other recreational facilities, taking into consideration soil texture, reaction, depth, and slope, as well as the hazards of flooding, erosion, and fire. It is also taking into account existing trail systems and the location, size, and types of rivers and streams.

The soils of the survey area are rated in table 5 according to limitations that affect their suitability for camp areas, picnic areas, playgrounds, and paths and trails. The ratings are based on such restrictive soil features as susceptibility to flooding, wetness, slope, and texture of the surface layer. Not considered in these ratings, but important in evaluating a site, are location and accessibility of the area; size, shape, and scenic quality of the area; the ability of the soil to support vegetation; access to water; potential water impoundment sites available; and either access to public sewerlines or capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited for recreational use, in varying degrees, by the duration of flooding and the season when flooding occurs. Onsite assessment of the height, duration, and frequency of flooding is essential in planning recreational facilities.

In table 5 the limitations of soils are rated slight, moderate, or severe for recreational sites. *Slight* means that the soil properties are generally favorable and that the limitations are minor and easily overcome. *Moderate* means that the limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in the table can be supplemented by additional information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields and for dwellings without basements and local roads and streets, given in tables in the section "Engineering."

The recreational uses listed in table 5 are discussed in the following paragraphs.

Camp areas require site preparation, such as shaping and leveling tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy

TABLE 4.—*Soil ratings*

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates the soil was not rated. No rat- and dumps (Pm), Psamments and Fluvents,

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees
Alo:				
AaC	Good	Good	Poor	
AaD, AaE	Fair	Fair	Poor	
AaF, Ab For Millsholm part of Ab, see Millsholm series.	Poor	Poor	Poor	
Alo part of Mk	Very poor	Very poor	Poor	
Alviso:				
Ac	Very poor	Very poor	Poor	
Ad	Poor	Fair	Poor	
Antioch:				
AeA	Fair	Fair	Good	
AeC	Fair	Fair	Good	
AeD	Poor	Fair	Good	
Aquic Xerofluvents: Af	Good	Good	Good	
Arbuckle:				
AgC	Fair	Good	Good	
AgD	Fair	Good	Good	
Arbuckle part of PoE	Poor	Fair	Good	
Arnold:				
AkD	Fair	Good	Fair	
AkF, Am San Andreas part of Am not rated.	Very poor	Very poor	Fair	
Ar Santa Ynez part of Ar not rated.	Poor	Fair	Fair	
Arroyo Seco:				
AsA, AsB, AsC	Fair	Fair	Fair	
AvA, AvB	Good	Good	Good	
Ayar:				
AyD	Fair	Fair	Good	
AyE	Poor	Poor	Good	
AyF	Very poor	Poor	Good	
Baywood: BbC	Poor	Poor	Fair	
Chamise:				
CaD, CaE	Poor	Fair	Fair	
CaF	Very poor	Poor	Fair	
Chualar: CbA, CbB, CbC	Good	Good	Good	
Cieneba: CcG, Cd, Ce For Sur part of Ce, see Sur series. Rock outcrop part of Cd and Ce is not rated.	Very poor	Very poor	Poor	
Clear Lake: Cf, Cg	Fair	Fair	Poor	

for wildlife habitat

ings were given for Badland (Ba), Coastal beaches (Cm), Dune land (Df), Lopez shaly loam, 15 to 30 percent slopes (LhE), Pits frequently flooded (Ps), or Rock outcrop]

Potential for habitat elements—Continued				Potential as habitat for—			
Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
	Poor	Poor	Very poor	Fair		Very poor	Poor.
	Poor	Very poor	Very poor	Fair		Very poor	Poor.
	Poor	Very poor	Very poor	Poor		Very poor	Poor.
	Poor	Very poor	Very poor	Very poor		Very poor	Poor.
	Very poor	Good	Good	Very poor		Good	Very poor.
	Poor	Good	Good	Poor		Good	Poor.
	Good	Fair	Fair	Fair		Fair	Good.
	Good	Poor	Very poor	Fair		Very poor	Good.
	Good	Very poor	Very poor	Fair		Very poor	Good.
	Good	Poor	Very poor	Good		Poor	Good.
	Good	Poor	Very poor	Good		Very poor	Good.
	Good	Very poor	Very poor	Good		Very poor	Good.
	Good	Very poor	Very poor	Fair		Very poor	Good.
	Fair	Very poor	Very poor	Fair		Very poor	Fair.
	Fair	Very poor	Very poor	Poor		Very poor	Fair.
	Fair	Very poor	Very poor	Fair		Very poor	Fair.
	Fair	Very poor	Very poor	Fair		Very poor	Fair.
	Good	Very poor	Very poor	Good		Very poor	Good.
	Fair	Very poor	Very poor	Fair		Very poor	Fair.
	Fair	Very poor	Very poor	Poor		Very poor	Fair.
	Fair	Very poor	Very poor	Poor		Very poor	Fair.
	Fair	Very poor	Very poor	Poor		Very poor	Fair.
	Fair	Very poor	Very poor	Fair		Very poor	Fair.
	Fair	Very poor	Very poor	Poor		Very poor	Fair.
	Good	Very poor	Very poor	Good		Very poor	Good.
	Poor	Very poor	Very poor	Very poor		Very poor	Poor.
	Poor	Poor	Fair	Fair		Poor	Poor.

TABLE 4.—*Soil ratings for*

Soil name and map symbol	Potential for habitat elements			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees
Climara:				
ChE	Fair	Good	Poor	
ChF For Montara part, see Montara series.	Poor	Fair	Poor	
Ck	Very poor	Very poor	Poor	
Cropley:				
CnA	Fair	Good	Poor	
CnC	Fair	Good	Poor	
Danville:				
DaA	Fair	Good	Good	
DaC	Fair	Good	Good	
Diablo:				
DbD, DbE	Fair	Good	Poor	
DbF	Poor	Fair	Poor	
Diablo part of LcG2	Very poor	Very poor	Poor	
Dibble:				
DcC, DdB, DdE	Fair	Good	Good	
DdF	Poor	Fair	Good	
Docas:				
DeA	Good	Good	Good	
DeC	Good	Good	Good	
Elder: EaA, EcA, EbC	Fair	Good	Good	
Elkhorn: EdB, EdC, EdD	Fair	Good	Good	
Elkhorn variant: EeD, EeE	Fair	Good	Good	
Fluvents, stony: Fa	Very poor	Very poor	Poor	
Gamboa: Ga For Sur part, see Sur series. For Junipero part, see Junipero series.	Very poor	Very poor	Fair	Fair
Garey:				
GbC, GbE	Fair	Good	Good	
GbF2, Gc For Oceano part of Gc, see Oceano series.	Poor	Fair	Good	
Gaviota: GdE, GdF, GeE, GeG For San Andreas part of GeE and GeG, see ScG in San Andreas series.	Very poor	Very poor	Fair	
Gazos:				
GfE	Fair	Good	Good	
GfF	Poor	Fair	Good	
Gazos part of Mm	Very poor	Very poor	Good	
Gilroy:				
GgE	Poor	Fair	Good	
GgG2	Very poor	Poor	Good	
Gilroy part of MbE	Fair	Good	Good	

wildlife habitat—Continued

Potential for habitat elements—Continued				Potential as habitat for—			
Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
	Poor	Very poor	Very poor	Fair		Very poor	Poor.
	Poor	Very poor	Very poor	Poor		Very poor	Poor.
	Poor	Very poor	Very poor	Very poor		Very poor	Poor.
	Poor	Poor	Fair	Fair		Poor	Poor.
	Poor	Poor	Very poor	Fair		Very poor	Poor.
	Good	Good	Fair	Good		Fair	Good.
	Good	Poor	Very poor	Good		Very poor	Good.
	Poor	Very poor	Very poor	Fair		Very poor	Poor.
	Poor	Very poor	Very poor	Poor		Very poor	Poor.
	Poor	Very poor	Very poor	Poor		Very poor	Poor.
	Good	Very poor	Very poor	Good		Very poor	Good.
	Good	Very poor	Very poor	Fair		Very poor	Good.
	Good	Poor	Poor	Good		Poor	Good.
	Good	Very poor	Very poor	Good		Very poor	Good.
	Good	Very poor	Very poor	Good		Very poor	Good.
	Good	Very poor	Very poor	Good		Very poor	Good.
	Good	Very poor	Very poor	Good		Very poor	Good.
	Poor	Very poor	Very poor	Very poor		Very poor	Poor.
Fair		Very poor	Very poor	Poor	Fair	Very poor	
	Good	Very poor	Very poor	Good		Very poor	Good.
	Good	Very poor	Very poor	Fair		Very poor	Good.
	Poor	Very poor	Very poor	Poor		Very poor	Poor.
	Good	Very poor	Very poor	Good		Very poor	Good.
	Good	Very poor	Very poor	Fair		Very poor	Good.
	Good	Very poor	Very poor	Poor		Very poor	Good.
	Good	Very poor	Very poor	Fair		Very poor	Good.
	Good	Very poor	Very poor	Poor		Very poor	Good.
	Good	Very poor	Very poor	Good		Very poor	Good.

TABLE 4.—*Soil ratings for*

Soil name and map symbol	Potential for habitat elements			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees
Gloria:				
GhC	Fair	Good	Good	
GhD	Fair	Good	Good	
GhF	Very poor	Very poor	Good	
Gorgonio: GkB	Fair	Fair	Good	
Greenfield:				
GmB, GmC	Good	Good	Good	
GmD	Fair	Good	Good	
Greenfield part of SpE2	Poor	Fair	Good	
Haire: HaE	Poor	Poor	Good	
Hanford: HbB	Fair	Good	Good	
Henneke: HcF	Very poor	Very poor	Poor	
Junipero: JaF, JbG, Jc For Sur part of Jc, see Sur series.	Very poor	Very poor	Fair	
Linne:				
LaD, LaE, LbD, LbE, LcE For Diablo part of LbD and LbE see DbD in Diablo series. For Shedd part of LcE, see SnD in Shedd series.	Fair	Good	Good	
LaF, LcF For Shedd part of LcF, see SnF2 in Shedd series; for Diablo part, see DbF in Diablo series.	Poor	Fair	Good	
LcF2, LcG2 For Shedd part of LcF2, see SnF2 in Shedd series, and for Shedd part of LcG2, see SmG3. For Diablo part of LcG2, see Diablo series.	Very poor	Very poor	Fair	
Lockwood:				
LdA, LeA	Good	Good	Good	
LdC, LeC	Good	Good	Good	
LeD	Fair	Good	Good	
LgA	Good	Good	Good	
Los Gatos:				
LkF	Poor	Poor	Good	
LkG	Very poor	Very poor	Good	
Los Osos:				
LmD, LmE	Fair	Fair	Good	
LmF	Poor	Fair	Good	
LmG, Ln For Millsholm part of Ln, see Millsholm series.	Very poor	Very poor	Good	
McCoy:				
MaE, MbE For Gilroy part of MbE, see Gilroy series.	Fair	Good	Good	
MaF	Poor	Fair	Good	
MaG, MbG For Gilroy part of MbG, see GgG2 in Gilroy series.	Very poor	Very poor	Good	
McCoy variant: McG	Very poor	Poor	Good	

wildlife habitat—Continued

Potential for habitat elements—Continued				Potential as habitat for—			
Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
	Fair	Poor	Very poor	Good		Very poor	Good.
	Poor	Very poor	Very poor	Good		Very poor	Fair.
	Poor	Very poor	Very poor	Poor		Very poor	Fair.
	Good	Very poor	Very poor	Fair		Very poor	Fair.
	Good	Poor	Very poor	Good		Very poor	Good.
	Good	Very poor	Very poor	Good		Very poor	Good.
	Good	Very poor	Very poor	Fair		Very poor	Good.
	Fair	Very poor	Very poor	Poor		Very poor	Fair.
	Good	Poor	Very poor	Good		Very poor	Good.
	Poor	Very poor	Very poor	Very poor		Very poor	Poor.
Good		Very poor	Very poor	Very poor	Fair	Very poor	
	Good	Very poor	Very poor	Good		Very poor	Good.
	Good	Very poor	Very poor	Fair		Very poor	Good.
	Good	Very poor	Very poor	Very poor		Very poor	Good.
	Good	Poor	Poor	Good		Poor	Good.
	Good	Poor	Very poor	Good		Very poor	Good.
	Good	Very poor	Very poor	Good		Very poor	Good.
	Good	Fair	Fair	Good		Fair	Good.
Good		Very poor	Very poor	Poor	Good	Very poor	
Good		Very poor	Very poor	Very poor	Fair	Very poor	
	Good	Very poor	Very poor	Fair		Very poor	Good.
	Good	Very poor	Very poor	Fair		Very poor	Good.
	Good	Very poor	Very poor	Poor		Very poor	Good.
	Good	Very poor	Very poor	Good		Very poor	Good.
	Good	Very poor	Very poor	Fair		Very poor	Good.
	Good	Very poor	Very poor	Poor		Very poor	Good.
	Fair	Very poor	Very poor	Very poor		Very poor	Fair.

TABLE 4.—*Soil ratings for*

Soil name and map symbol	Potential for habitat elements			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees
McMullin: Md. For Plaskett part, see Plaskett series.	Very poor	Very poor	Fair	
Metz:				
Me, Mf	Good	Good	Good	
Mg	Poor	Poor	Fair	
Millsholm: MhG, Mk, Mm. For Alo part of Mk, see Alo series. For Gazos part of Mm, see Gazos series.	Very poor	Very poor	Poor	
Mocho:				
MnA, MoA	Good	Good	Good	
MoC	Good	Good	Good	
Montara: Mp. Rock outcrop part not rated.	Very poor	Very poor	Poor	
Nacimiento:				
NaD	Good	Good	Good	
NaE	Fair	Fair	Good	
NaF, NbF. For Los Osos part of NbF, see LmF in Los Osos series; for San Benito part, see SdF in San Benito series.	Poor	Poor	Good	
NaG, NbG. For Los Osos part of NbG, see LmG in Los Osos series; for San Benito part, see SdG in San Benito series.	Very poor	Poor	Good	
Narlon:				
NcC	Fair	Fair	Good	
NcE	Very poor	Very poor	Good	
Oceano:				
OaD	Poor	Poor	Good	
Oceano part of Gc	Very poor	Very poor	Good	
Pacheco:				
Pa	Poor	Fair	Fair	
Pb	Good	Good	Fair	
Parkfield:				
PcC	Fair	Good	Good	
PcE	Poor	Fair	Good	
Pfeiffer:				
PdC	Fair	Good	Good	
PdD	Fair	Good	Good	
Pe. Rock outcrop part not rated.	Very poor	Poor	Good	
Pico: Pf	Good	Good	Good	
Pinnacles:				
PgE	Poor	Fair	Good	
PhG2	Very poor	Very poor	Fair	

wildlife habitat—Continued

Potential for habitat elements—Continued				Potential as habitat for—			
Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
	Poor	Very poor	Very poor	Poor		Very poor	Poor.
	Good	Very poor	Very poor	Good		Very poor	Good.
	Fair	Very poor	Very poor	Poor		Very poor	Fair.
	Poor	Very poor	Very poor	Very poor		Very poor	Poor.
	Good	Poor	Poor	Good		Poor	Good.
	Good	Poor	Very poor	Good		Very poor	Good.
	Fair	Very poor	Very poor	Very poor		Very poor	Poor.
	Good	Very poor	Very poor	Good		Very poor	Good.
	Good	Very poor	Very poor	Fair		Very poor	Good.
	Good	Very poor	Very poor	Fair		Very poor	Good.
	Good	Very poor	Very poor	Poor		Very poor	Good.
Poor		Poor	Very poor	Fair	Fair	Very poor	
Poor		Poor	Very poor	Poor	Fair	Very poor	
	Fair	Very poor	Very poor	Fair		Very poor	Fair
	Fair	Very poor	Very poor	Poor		Very poor	Fair.
	Poor	Good	Good	Poor		Good	Poor.
	Fair	Good	Good	Good		Good	Fair.
	Poor	Poor	Very poor	Fair		Very poor	Fair.
	Poor	Very poor	Very poor	Fair		Very poor	Fair.
	Good	Poor	Very poor	Good		Very poor	Good.
	Good	Very poor	Very poor	Good		Very poor	Good.
	Fair	Very poor	Very poor	Poor		Very poor	Fair.
	Good	Poor	Very poor	Good		Very poor	Good.
	Fair	Very poor	Very poor	Fair		Very poor	Fair.
	Fair	Very poor	Very poor	Poor		Very poor	Fair.

TABLE 4.—*Soil ratings for*

Soil name and map symbol	Potential for habitat elements			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees
Pinnacles variant:				
PkE	Very poor	Poor	Poor	
PkF	Very poor	Very poor	Poor	
Placentia:				
PnA	Fair	Good	Good	
PnC, PnD	Poor	Fair	Fair	
PnE, PoE For Arbuckle part of PoE, see Arbuckle series.	Very poor	Fair	Fair	
Plaskett: Pp For Reliz part, see Reliz series.	Very poor	Very poor	Poor	
Psamments and Fluvents, occasionally flooded:				
Pr:				
Psamments part	Poor	Poor	Fair	
Fluvents part	Poor	Poor	Poor	
Reliz series	Very poor	Poor	Poor	
Rincon:				
RaA	Good	Good	Fair	
RaC	Good	Good	Fair	
RaD	Fair	Good	Fair	
RaE	Poor	Fair	Fair	
Rindge: Rb	Very poor	Very poor	Poor	
Salinas:				
SaA, SbA	Good	Good	Good	
SbC	Good	Good	Good	
San Andreas:				
ScE	Poor	Fair	Good	
ScG	Very poor	Fair		
San Benito:				
SdF	Poor	Fair	Good	
SdG	Very poor	Very poor	Good	
San Timoteo: SeG	Very poor	Very poor	Fair	
Santa Lucia:				
SfD, SfE	Fair	Good	Fair	
SfF	Poor	Fair	Fair	
Sg For Reliz part, see Reliz series. Lopez part not rated.	Very poor	Very poor	Fair	
Santa Ynez:				
ShC	Poor	Poor	Fair	
ShD, ShD2	Poor	Poor	Fair	
ShE	Very poor	Poor	Fair	

wildlife habitat—Continued

Potential for habitat elements—Continued				Potential as habitat for—			
Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
	Poor	Very poor	Very poor	Poor		Very poor	Poor.
	Poor	Very poor	Very poor	Very poor		Very poor	Poor.
	Fair	Good	Fair	Good		Fair	Fair.
	Poor	Poor	Very poor	Fair		Poor	Poor.
	Poor	Very poor	Very poor	Fair		Very poor	Poor.
Very poor		Very poor	Very poor	Very poor	Very poor	Very poor	
	Fair	Poor	Very poor	Poor		Very poor	Fair.
	Poor	Very poor	Very poor	Poor		Very poor	Poor.
	Poor	Very poor	Very poor	Poor		Very poor	Poor.
	Good	Good	Good	Good		Good	Fair.
	Good	Poor	Very poor	Good		Poor	Fair.
	Good	Very poor	Very poor	Fair		Very poor	Fair.
	Good	Very poor	Very poor	Poor		Very poor	Fair.
	Very poor	Good	Good	Very poor		Good	Very poor.
	Good	Poor	Poor	Good		Poor	Good.
	Good	Poor	Very poor	Good		Very poor	Good.
	Good	Very poor	Very poor	Fair		Very poor	Good.
Fair	Very poor	Very poor	Very poor	Very poor		Very poor	Fair.
	Good	Very poor	Very poor	Fair		Very poor	Good.
	Good	Very poor	Very poor	Poor		Very poor	Good.
	Fair	Very poor	Very poor	Poor		Very poor	Fair.
	Fair	Very poor	Very poor	Fair		Very poor	Fair.
	Fair	Very poor	Very poor	Fair		Very poor	Fair.
	Fair	Very poor	Very poor	Poor		Very poor	Fair.
	Fair	Poor	Very poor	Poor		Very poor	Fair.
	Fair	Very poor	Very poor	Poor		Very poor	Fair.
	Fair	Very poor	Very poor	Poor		Very poor	Fair.

TABLE 4.—*Soil ratings for*

Soil name and map symbol	Potential for habitat elements			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees
Shedd:				
SmG3	Very poor	Very poor	Good	
SnD, SnE	Fair	Fair	Good	
SnF2	Poor	Fair	Good	
Sheridan:				
SoD	Fair	Good	Good	
SoE	Poor	Fair	Good	
SoG	Very poor	Very poor	Good	
Snelling: SpD, SpE2	Fair	Good	Good	
For Greenfield part of SpD, see GmD in Greenfield series. For Greenfield part of SpE2, see Greenfield series.				
Sorrento:				
SrA	Good	Good	Good	
SrC	Good	Good	Good	
Sur: Ss, St	Very poor	Poor	Poor	
For Junipero part of Ss, see Junipero series. For Plaskett part of St, see Plaskett series.				
Tangair: TaC	Fair	Fair	Fair	
Tujunga: TbB	Poor	Fair	Fair	
Vista:				
VaD	Fair	Fair	Fair	
VaE	Poor	Poor	Fair	
VaG, Vb	Very poor	Very poor	Fair	
Rock outcrop part of Vb not rated.				
Xererts-Xerolls complex:				
Xa:				
Xererts part	Very poor	Very poor	Fair	
Xerolls part	Very poor	Very poor	Good	
Xerorthents, sandy: Xb	Very poor	Very poor	Fair	
Xerorthents, loamy: Xc	Poor	Fair	Fair	
Xerorthents, dissected: Xd	Very poor	Very poor	Fair	
Xerorthents part of Rc	Very poor	Very poor	Poor	

foot traffic and some vehicular traffic. The best soils for this use have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm when wet, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing camping sites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for use as picnic areas are firm when wet, are not dusty when dry, and are not subject to flooding during the period of use. They do not have slopes or stones or boulders that will increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are neither wet nor subject to flooding during the season of use. The surface is free of stones or boulders, is firm after rains, and is not dusty when dry. If shaping

wildlife habitat—Continued

Potential for habitat elements—Continued				Potential as habitat for—			
Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
	Good	Very poor	Very poor	Poor		Very poor	Good.
	Good	Very poor	Very poor	Good		Very poor	Good.
	Good	Very poor	Very poor	Fair		Very poor	Good.
	Fair	Very poor	Very poor	Good		Very poor	Fair.
	Fair	Very poor	Very poor	Fair		Very poor	Fair.
	Fair	Very poor	Very poor	Poor		Very poor	Fair.
	Good	Very poor	Very poor	Good		Very poor	Good.
	Good	Poor	Poor	Good		Poor	Good.
	Good	Poor	Very poor	Good		Very poor	Good.
Poor		Very poor	Very poor	Very poor	Poor	Very poor	
	Fair	Fair	Very poor	Fair		Poor	Fair.
	Good	Very poor	Very poor	Fair		Very poor	Good.
	Fair	Very poor	Very poor	Fair		Very poor	Fair.
	Fair	Very poor	Very poor	Poor		Very poor	Fair.
	Fair	Very poor	Very poor	Very poor		Very poor	Fair.
	Fair	Very poor	Very poor	Poor		Very poor	Fair.
	Good	Very poor	Very poor	Poor		Very poor	Good.
	Fair	Very poor	Very poor	Poor		Very poor	Fair.
	Fair	Very poor	Very poor	Fair		Very poor	Fair.
	Fair	Very poor	Very poor	Poor		Very poor	Fair.
	Poor	Very poor	Very poor	Very poor		Very poor	Poor.

is required to obtain a uniform grade, the depth of the soil over rock should be sufficient to allow necessary grading.

The design and layout of paths and trails for walking, horseback riding, and bicycling should require little or no cutting and filling. The best soils for this use are those that are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once during the period of use. They should have moderate slopes and have few or no stones or boulders on the surface.

Engineering[6]

This section provides information about the use of soils for building sites, sanitary facilities, construction

[6] EVERETT JAHR, civil engineer, and WILLIS SLATTON, agricultural engineer, helped prepare this section.

TABLE 5.—*Soil ratings for recreational development*

["Shrink-swell," "percs slowly," and other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe"]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Alo:				
AaC	Severe: too clayey	Severe: too clayey	Severe: too clayey	Severe: too clayey.
AaD	Severe: too clayey	Severe: too clayey	Severe: too clayey, slope	Severe: too clayey.
AaE	Severe: too clayey, slope	Severe: too clayey, slope.	Severe: too clayey, slope	Severe: too clayey.
AaF, Ab [1]	Severe: too clayey, slope	Severe: too clayey, slope.	Severe: too clayey, slope	Severe: too clayey, slope.
Millsholm part of Ab	Severe: slope	Severe: slope	Severe: slope, depth to rock.	Severe: slope.
Alviso:				
Ac	Severe: wetness, floods, too clayey.	Severe: wetness, floods, too clayey.	Severe: wetness, floods, too clayey.	Severe: wetness, floods, too clayey.
Ad	Severe: wetness, too clayey.	Severe: wetness, too clayey.	Severe: wetness, too clayey.	Severe: wetness, too clayey.
Antioch:				
AeA, AeC	Severe: percs slowly	Slight	Severe: percs slowly	Slight.
AeD	Severe: percs slowly	Moderate: slope	Severe: percs slowly	Slight.
Aquic Xerofluvents: Af	Severe: floods	Severe: floods	Severe: floods	Severe: floods.
Arbuckle:				
AgC	Moderate: small stones	Moderate: small stones	Moderate: small stones	Moderate: small stones.
AgD	Moderate: small stones	Moderate: small stones	Severe: slope	Moderate: small stones.
Arnold:				
AkD	Moderate: slope, too sandy.	Moderate: slope, too sandy.	Severe: slope	Moderate: slope, too sandy.
AkF, Am [1] Ratings apply to both Arnold and San Andreas part of Am.	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Ar [1]:				
Arnold part	Severe: slope	Severe: slope	Severe: slope	Moderate: slope, too sandy.
Santa Ynez part	Severe: slope	Severe: slope	Severe: slope, percs slowly.	Moderate: slope, small stones.
Arroyo Seco:				
AsA, AsB, AvA, AvB	Moderate: small stones	Moderate: small stones	Severe: small stones	Moderate: small stones.
AsC	Moderate: small stones	Moderate: small stones	Severe: slope, small stones.	Moderate: small stones.
Ayar:				
AyD	Severe: too clayey	Severe: too clayey	Severe: slope, too clayey	Severe: too clayey.
AyE	Severe: slope, too clayey	Severe: slope, too clayey	Severe: slope, too clayey	Severe: too clayey.
AyF	Severe: slope, too clayey	Severe: slope, too clayey	Severe: slope, too clayey	Severe: slope, too clayey.

Badland: Ba. Not rated.				
Baywood: BbC	Severe: too sandy, soil blowing.	Severe: too sandy, soil blowing.	Severe: slope, too sandy, soil blowing.	Severe: too sandy, soil blowing.
Chamise:				
CaD	Moderate: slope, small stones, percs slowly.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
CaE	Severe: slope	Severe: slope	Severe: slope, small stones.	Moderate: slope, small stones.
CaF	Severe: slope	Severe: slope	Severe: slope, small stones.	Severe: slope.
Chualar:				
CbA	Moderate: percs slowly	Slight	Moderate: small stones	Slight.
CbB	Moderate: percs slowly	Slight	Moderate: slope, small stones.	Slight.
CbC	Moderate: percs slowly	Slight	Severe: slope	Slight.
Cieneba: CcG, Cd,[1] Ce[1] No ratings for Rock outcrop part of Cd, Ce.	Severe: slope	Severe: slope	Severe: slope, depth to rock, small stones.	Severe: slope.
Sur part of Ce	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.
Clear Lake:				
Cf	Severe: wetness, floods, too clayey.	Severe: wetness, floods, too clayey.	Severe: wetness, floods, too clayey.	Severe: wetness, floods, too clayey.
Cg	Severe: too clayey, floods	Severe: too clayey	Severe: too clayey, floods	Severe: too clayey.
Climara:				
ChE	Severe: slope, too clayey	Severe: slope, too clayey	Severe: slope, too clayey	Severe: too clayey.
ChF, Ck[1]	Severe: slope, too clayey	Severe: slope, too clayey	Severe: slope, too clayey	Severe: slope, too clayey.
Montara part of Ck	Severe: slope	Severe: slope	Severe: slope, depth to rock.	Severe: slope.
Coastal beaches: Cm. Not rated.				
Cropley: CnA, CnC	Severe: too clayey	Severe: too clayey	Severe: too clayey	Severe: too clayey.
Danville:				
DaA	Moderate: percs slowly, too clayey.	Moderate: too clayey	Moderate: percs slowly, too clayey.	Moderate: too clayey.
DaC	Moderate: percs slowly, too clayey.	Moderate: too clayey	Moderate: slope, percs slowly, too clayey.	Moderate: too clayey.
Diablo:				
DbD	Severe: too clayey	Severe: too clayey	Severe: slope, too clayey	Severe: too clayey.
DbE	Severe: slope, too clayey	Severe: too clayey, slope	Severe: slope, too clayey	Severe: too clayey.
DbF	Severe: slope, too clayey	Severe: too clayey, slope	Severe: slope, too clayey	Severe: slope, too clayey.
Dibble:				
DcC	Moderate: percs slowly	Slight	Moderate: slope, depth to rock, percs slowly.	Slight.

See footnote at end of table.

TABLE 5.—*Soil ratings for recreational development*—Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Dibble—Con.				
DdB	Moderate: slope, percs slowly.	Moderate: slope	Severe: slope	Slight.
DdE	Severe	Severe: slope	Severe: slope	Moderate: slope.
DdF	Severe	Severe: slope	Severe: slope	Severe: slope.
Docas:				
DeA	Moderate: too clayey, percs slowly.	Moderate: too clayey	Moderate: too clayey, percs slowly.	Moderate: too clayey.
DeC	Moderate: too clayey, percs slowly.	Moderate: too clayey	Moderate: slope, too clayey, percs slowly.	Moderate: too clayey.
Dune land: Df. Not rated.				
Elder:				
EeA, EcA	Slight	Slight	Slight	Slight.
EbC	Slight	Slight	Moderate: slope	Slight.
Elkhorn:				
EdB, EdC	Moderate: percs slowly	Slight	Moderate: slope, percs slowly.	Slight.
EdD	Moderate: slope, percs slowly.	Moderate: slope	Severe: slope	Slight.
Elkhorn variant:				
EeD	Moderate: slope, percs slowly.	Moderate: slope	Severe: slope	Slight.
EeE	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.
Fluvents, stony: Fa	Severe: large stones, floods.	Severe: large stones, floods.	Severe: large stones, floods.	Severe: large stones, floods.
Gamboa: Ga.[1]				
Gamboa part	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.
Sur part	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.
Junipero part	Severe: slope	Severe: slope	Severe: slope, small stones.	Severe: slope.
Garey:				
GbC	Moderate: percs slowly	Slight	Moderate: slope, percs slowly.	Slight.
GbE	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.
GbF2, Gc[1]	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Oceano part of Gc	Severe: slope, dusty	Severe: slope, dusty	Severe: too sandy, slope	Severe: slope, dusty.

Gaviota:				
GdE, GeE[1]	Severe: slope	Severe: slope	Severe: slope, depth to rock.	Moderate: slope.
San Andreas part of GeE	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.
GdF, GeG[1]	Severe: slope	Severe: slope	Severe: slope, depth to rock.	Severe: slope.
San Andreas part of GeG	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Gazos:				
GfE	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.
GfF	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Gilroy: GgE, GgG2	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Gloria:				
GhC	Severe: percs slowly	Slight	Severe: percs slowly	Slight.
GhD	Severe: percs slowly	Moderate: slope	Severe: slope, percs slowly.	Slight.
GhF	Severe: slope, percs slowly.	Severe: slope	Severe: slope, percs slowly.	Severe: slope.
Gorgonio: GkB	Moderate: too sandy	Moderate: too sandy	Moderate: too sandy	Moderate: too sandy.
Greenfield:				
GmB	Slight	Slight	Moderate: small stones	Slight.
GmC	Slight	Slight	Severe: slope	Slight.
GmD	Moderate: slope	Moderate: slope	Severe: slope	Slight.
Haire: HaE	Severe: slope, percs slowly.	Severe: slope	Severe: percs slowly, slope.	Moderate: dusty.
Hanford: HbB	Moderate: small stones	Moderate: small stones	Severe: small stones	Slight.
Henneke: HcF	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, large stones.
Junipero: JaF, JbG, Jc[1]	Severe: slope	Severe: slope	Severe: slope, small stones.	Severe: slope.
Sur part of Jc	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.
Linne:				
LaD, LbD[1]	Moderate: slope, too clayey, percs slowly.	Moderate: slope, too clayey.	Severe: slope	Moderate: too clayey.
Diablo part of LbD	Severe: too clayey	Severe: too clayey	Severe: slope, too clayey	Severe: too clayey.
LaE, LbE,[1] LcE[1]	Severe: slope	Severe: slope	Severe: slope	Moderate: too clayey.
Diablo part of LbE	Severe: slope, too clayey	Severe: too clayey, slope	Severe: slope, too clayey	Severe: too clayey.
Shedd part of LcE	Severe: slope	Severe: slope	Severe: slope	Moderate: slope, too clayey.
LaF, LcF,[1] LcF2,[1] LcG2[1]	Severe: slope	Severe: slope	Severe: slope	Severe: small stones.
Shedd part of LcF, LcF2, LcG2.	Severe: slope	Severe: slope	Severe: slope	Severe: slope.

See footnote at end of table.

TABLE 5.—*Soil ratings for recreational development*—Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Linne—Con. Diablo part of LcF, LcG2	Severe: slope, too clayey	Severe: too clayey, slope	Severe: slope, too clayey	Severe: slope, too clayey.
Lockwood: LdA, LdC	Slight	Slight	Moderate: small stones	Slight.
LeA, LeC	Moderate: small stones	Moderate: small stones	Severe: small stones	Moderate: small stones.
LeD	Moderate: small stones	Moderate: small stones	Severe: slope, small stones.	Moderate: small stones.
LgA	Moderate: wetness, percs slowly.	Slight	Moderate: wetness, percs slowly.	Slight.
Lopez: LhE	Severe: slope	Severe: slope	Severe: slope, small stones, depth to rock.	Moderate: slope, small stones.
Los Gatos: LkF, LkG	Severe: slope	Severe: slope	Severe: slope, small stones.	Severe: slope.
Los Osos: LmD	Moderate: slope, too clayey, percs slowly.	Moderate: slope, too clayey.	Severe: slope	Moderate: too clayey.
LmE	Severe: slope	Severe: slope	Severe: slope	Moderate: slope, too clayey.
LmF, LmG, Ln[1]	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Millsholm part of Ln	Severe: slope	Severe: slope	Severe: slope, depth to rock.	Severe: slope
McCoy: MaE, MbE[1]	Severe: slope	Severe: slope	Severe: slope	Moderate: slope, too clayey.
Gilroy part of MbE	Severe: slope	Severe: slope	Severe: slope	Moderate: slope, small stones.
MaF, MaG, MbG[1]	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Gilroy part of MbG	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
McCoy variant: McG	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones, small stones.	Severe: slope, large stones.
McMullin: Md[1]	Severe: slope	Severe: slope	Severe: slope, small stones, depth to rock.	Severe: slope.
Plaskett part	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, depth to rock, small stones.	Severe: slope, small stones.
Metz: Me	Moderate: too sandy	Moderate: too sandy	Moderate: too sandy	Moderate: too sandy.
Mf	Slight	Slight	Slight	Slight.
Mg[1]: Mainly loamy sand surface layer.	Moderate: too sandy	Moderate: too sandy	Moderate: slope, too sandy.	Moderate: too sandy.
Mainly fine sandy loam surface layer.	Slight	Slight	Moderate: slope	Slight.

Millsholm: MhG, Mk,[1] Mm [1]	Severe: slope	Severe: slope	Severe: slope, depth to rock.	Severe: slope.
Alo part of Mk	Severe: too clayey, slope.	Severe: too clayey, slope	Severe: too clayey, slope	Severe: too clayey, slope.
Gazos part of Mm	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Mocho: MnA	Slight	Slight	Slight	Slight.
MoA	Moderate: too clayey	Moderate: too clayey	Moderate: too clayey	Moderate: too clayey.
MoC	Moderate: too clayey	Moderate: too clayey	Moderate: slope, too clayey.	Moderate: too clayey.
Montara: Mp [1] Rock outcrop part not rated.	Severe: slope	Severe: slope	Severe: slope, depth to rock.	Severe: slope.
Nacimiento: NaD	Moderate: slope, too clayey, percs slowly.	Moderate: slope, too clayey.	Severe: slope	Moderate: too clayey.
NaE	Severe: slope	Severe: slope	Severe: slope	Moderate: slope, too clayey.
NaF, NaG, NbF,[1] NbG [1]	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Los Osos part of NbF, NbG	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
San Benito part of NbF, NbG.	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Narlon: NcC	Severe: percs slowly, dusty.	Severe: dusty	Severe: dusty, percs slowly.	Moderate: too sandy.
NcE	Severe: slope, dusty, percs slowly.	Severe: slope, dusty	Severe: slope, dusty, percs slowly.	Moderate: slope, too sandy.
Oceano: OaD	Severe: dusty	Severe: dusty	Severe: too sandy, slope	Severe: dusty.
Pacheco: Pa	Moderate: too clayey, wetness.	Moderate: too clayey	Moderate: too clayey	Moderate: too clayey.
Pb	Severe: floods	Moderate: too clayey	Moderate: too clayey	Moderate: too clayey.
Parkfield: PcC	Severe: too clayey	Severe: too clayey	Severe: too clayey	Severe: too clayey.
PcE	Severe: slope, too clayey	Severe: slope, too clayey	Severe: slope, too clayey	Severe: too clayey.
Pfeiffer: PdC	Slight	Slight	Moderate: small stones	Slight.
PdD	Moderate: slope	Moderate: slope	Severe: slope	Slight.
Pe [1] Rock outcrop part not rated.	Severe: slope	Severe: slope	Severe: slope, small stones.	Severe: slope.
Pico: Pf	Slight	Slight	Slight	Slight.
Pinnacles: PgE	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.

See footnote at end of table.

TABLE 5.—*Soil ratings for recreational development*—Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Pinnacles—Con.				
PhG2	Severe: slope	Severe: slope	Severe: slope, small stones, large stones.	Severe: slope.
Pinnacles variant:				
PkE	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.
PkF	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Pits and dumps: Pm. No ratings.				
Placentia:				
PnA, PnC	Severe: percs slowly	Slight	Severe: percs slowly	Slight.
PnD	Severe: percs slowly	Moderate: slope	Severe: slope, percs slowly.	Slight.
PnE, PoE[1]	Severe: slope, percs slowly.	Severe: slope	Severe: slope, percs slowly.	Moderate: slope.
Arbuckle part of PoE	Severe: slope	Severe: slope	Severe: slope	Moderate: slope, small stones.
Plaskett: Pp[1]	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, depth to rock, small stones.	Severe: slope, small stones.
Reliz part	Severe: slope	Severe: slope	Severe: slope, depth to rock, small stones.	Severe: slope.
Psamments and Fluvents, flooded: Pr,[1] Ps.[1]				
Psamments part	Severe: floods, too sandy, wetness.	Severe: floods, too sandy, wetness.	Severe: floods, too sandy, wetness.	Severe: floods, too sandy, wetness.
Fluvents part	Severe: floods, small stones, too sandy.	Severe: floods, small stones, too sandy.	Severe: floods, small stones, too sandy.	Severe: floods, too sandy.
Rincon:				
RaA	Moderate: percs slowly, too clayey.	Moderate: too clayey	Moderate: percs slowly, too clayey.	Moderate: too clayey.
RaC	Moderate: percs slowly, too clayey.	Moderate: too clayey	Moderate: percs slowly, too clayey, slope.	Moderate: too clayey.
RaD	Moderate: percs slowly, too clayey, slope.	Moderate: too clayey, slope.	Severe: slope	Moderate: too clayey.
RaE	Severe: slope	Severe: slope	Severe: slope	Moderate: too clayey, slope.
Rindge: Rb	Severe: excess humus, wetness, dusty.	Severe: excess humus, wetness, dusty.	Severe: excess humus, wetness, dusty.	Severe: excess humus, wetness, dusty.
Rock outcrop: Rc.[1] Rock outcrop part not rated. For Xerorthents part, see Xerorthents, shallow.				
Salinas:				
SaA	Slight	Slight	Slight	Slight.

SbA	Moderate: too clayey	Moderate: too clayey	Moderate: too clayey	Moderate: too clayey.
SbC	Moderate: too clayey	Moderate: too clayey	Moderate: slope, too clayey.	Moderate: too clayey.
San Andreas:				
ScE	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.
ScG	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
San Benito: SdF, SdG	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
San Timoteo: SeG	Severe: slope	Severe: slope	Severe: slope, small stones.	Severe: slope.
Santa Lucia:				
SfD	Severe: small stones	Severe: small stones	Severe: slope, small stones.	Severe: small stones.
SfE	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones.
SfF, Sg[1]	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.
Reliz part of Sg	Severe: slope	Severe: slope	Severe: slope, depth to rock, small stones.	Severe: slope.
Lopez part of Sg	Severe: slope	Severe: slope	Severe: slope, small stones, depth to rock.	Severe: slope.
Santa Ynez:				
ShC	Moderate: percs slowly, small stones.	Moderate: small stones	Severe: percs slowly	Moderate: small stones.
ShD, ShD2	Moderate: slope, percs slowly, small stones.	Moderate: slope, small stones.	Severe: slope, percs slowly.	Moderate: small stones.
ShE	Severe: slope	Severe: slope	Severe: slope, percs slowly.	Moderate: slope, small stones.
Shedd:				
SmG3, SnF2	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
SnD	Moderate: slope, percs slowly, too clayey.	Moderate: slope, too clayey.	Severe: slope	Moderate: too clayey.
SnE	Severe: slope	Severe: slope	Severe: slope	Moderate: slope, too clayey.
Sheridan:				
SoD	Moderate: slope	Moderate: slope	Severe: slope	Slight.
SoE	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.
SoG	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Snelling:				
SpD[1]	Moderate: slope, percs slowly.	Moderate: slope	Severe: slope	Slight.
Greenfield part	Moderate: slope	Moderate: slope	Severe: slope	Slight.
SpE2[1]	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.
Greenfield part	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.

See footnote at end of table.

TABLE 5.—*Soil ratings for recreational development*—Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Sorrento:				
SrA	Moderate: too clayey, percs slowly.	Moderate: too clayey	Moderate: too clayey, percs slowly.	Moderate: too clayey.
SrC	Moderate: too clayey, percs slowly.	Moderate: too clayey	Moderate: slope, too clayey, percs slowly.	Moderate: too clayey.
Sur: Ss,[1] St[1]	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.
Junipero part of Ss	Severe: slope	Severe: slope	Severe: slope, small stones.	Severe: slope.
Plaskett part of St	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, depth to rock, small stones.	Severe: slope, small stones.
Tangair: TaC	Severe: wetness, too sandy, soil blowing.	Severe: wetness, too sandy, soil blowing.	Severe: wetness, too sandy, soil blowing.	Severe: wetness, too sandy, soil blowing.
Tujnnga: TbB	Severe: too sandy	Severe: too sandy	Severe: too sandy	Severe: too sandy.
Vista:				
VaD	Moderate: slope	Moderate: slope	Severe: slope	Slight.
VaE	Severe: slope	Severe: slope	Severe: slope	Moderate: slope.
VaG, Vb[1] Rock outcrop part of Vb not rated.	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Xererts-Xerolls complex: Xa.[1]				
Xererts part	Severe: slope, too clayey	Severe: slope, too clayey.	Severe: slope, too clayey	Severe: slope, too clayey.
Xerolls part	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Xerorthents, sandy: Xb	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Xerorthents, loamy: Xc	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Xerorthents, dissected: Xd	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Xerorthents, shallow	Severe: slope	Severe: slope	Severe: slope, depth to rock.	Severe: slope.

[1] This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

materials, and water management. Among those who can benefit from this section are engineers, landowners, community decision makers and planners, town and city managers, land developers, builders, contractors, and farmers and ranchers.

The ratings in the tables in this section are based on test data and estimated data. The ratings were determined jointly by soil scientists and engineers of the Soil Conservation Service using known relationships between the soil properties and the behavior of soils in various engineering uses.

Among the soil properties and site conditions identified by the soil survey and used in determining the ratings in this section are grain-size distribution, liquid limit, plasticity index, soil reaction, depth to and hardness of bedrock within 5 or 6 feet of the surface, soil wetness characteristics, depth to a seasonal water table, slope, likelihood of flooding, natural soil structure or aggregation, in-place soil density, and geologic origin of the soil material. Where pertinent, data about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of absorbed cations were also considered.

Based on the information assembled about soil properties, ranges of values can be estimated for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, shear strength, compressibility, slope stability, and other characteristics of the soil. These values may be applied to each major horizon of each soil or to the entire profile.

The factors of soil behavior affect construction and maintenance of roads, airport runways, pipelines, foundations for small buildings, ponds and small dams, irrigation projects, drainage systems, sewage and refuse disposal systems, and other engineering works. The data can be used to—

1. Select potential residential, commercial, industrial, and recreational areas.
2. Make preliminary estimates pertinent to construction in a particular area.
3. Evaluate alternate routes for roads, streets, highways, pipelines, and underground cables;
4. Evaluate alternate sites for location of sanitary landfills, onsite sewage disposal systems, and other waste disposal facilities.
5. Plan detailed onsite investigations of soils and geology.
6. Find sources of gravel, sand, clay, and topsoil.
7. Plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation.
8. Relate performance of structures already built to the properties of the kinds of soil on which they are built so that performance of similar structures on the same or a similar soil in other locations can be predicted.
9. Predict the trafficability of soils for cross-country movement of vehicles and construction equipment.

Data presented in this section are useful for land-use planning and for choosing alternative practices or general designs that will overcome unfavorable soil properties and minimize soil-related failures. Limitations to the use of these data, however, should be well understood. First, the data are generally not applicable to soil material below a depth of 5 or 6 feet. Also, because of the scale of the detailed map in this soil survey, small areas of soils that differ from the dominant soil may be included in mapping. Thus, these data do not eliminate the need for onsite investigations and testing.

The information is presented mainly in tables. Table 6 gives estimated engineering properties and classifications of the soils, table 7 gives the estimated physical and chemical properties, table 8 shows test data, and table 9 shows the soil and water features in Monterey County. Table 10 shows, for each kind of soil, ratings of the degree and kind of limitations for sanitary facilities; table 11, for construction sites; table 12, for construction material; and table 13, for water management.

The information in the tables, along with the soil map, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations and to construct interpretive maps for specific uses of land.

Some of the terms used in this soil survey have different meanings in soil science and in engineering. The Glossary defines many of these terms.

Soil properties

Extensive data about soil properties collected during the soil survey are summarized on the following pages. The two main sources of these data are the many thousands of soil borings made during the course of the survey and the laboratory analyses of samples selected from representative soil profiles in the field.

From soil borings made during field mapping, the soil scientist can identify several important soil properties. He notes the seasonal soil moisture condition, or the presence of free water and its depth in the profile. For each horizon, he notes the thickness of the soil and its color; the texture, or the amount of clay, silt, sand, and gravel or other coarse fragments; the structure, or natural pattern of cracks and pores in the undisturbed soil; and the consistence of soil in-place under the existing soil moisture conditions. He records the root depth of existing plants, determines soil pH, or reaction, and identifies any free carbonates.

Samples of soil material are analyzed in the laboratory to verify the field estimates of soil properties, especially properties that cannot be estimated accurately by field observation, and to characterize key soils. Laboratory analyses are not conducted for all soil series in the survey area, but laboratory data for many of the soil series are available from nearby areas.

The tables in this section list estimated ranges in engineering properties and classification and ranges in physical and chemical properties for the major horizons of each soil in the survey area. Also, pertinent soil and water features, engineering test data, and data obtained from laboratory analyses, both physical and chemical, are presented.

Engineering properties

Table 6 gives estimates of engineering properties and classifications for the major horizons of each soil in the

TABLE 6.—*Estimated engineering properties and classifications*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil which may have different properties and limitations. For this reason it is necessary to follow carefully the instructions for referring to other series that appear in the first column]

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >3 inches	Percentage passing sieve number—: 4	10	40	200	Liquid limit	Plasticity index
	In				*Pct*					*Pct*	
*Alo: AaC, AaD, AaE, AaF, Ab. For Millsholm part of Ab, see Millsholm series.	0–36	Silty clay	CH, CL	A-7	0	100	100	95–100	85–100	40–60	20–40
	36	Weathered bedrock.									
Alviso: Ac, Ad	0–14	Silty clay loam	CL, CH	A-6, A-7	0	100	100	90–100	75–100	35–60	15–30
	14–45	Silty clay	CH	A-7	0	80–100	80–100	75–100	75–100	50–70	30–50
	45–60	Very fine sand	SM	A-4	0	100	100	85–90	35–50	---	[1] NP
Antioch: AeA, AeC, AeD	0–21	Very fine sandy loam	ML	A-4, A-6	0	95–100	90–100	80–100	50–75	25–40	NP-15
	21–40	Clay	CL, CH	A-7	0	95–100	90–100	90–100	70–90	40–60	20–30
	40–67	Clay loam, sandy clay loam	CL	A-6, A-7	0	95–100	90–100	70–100	70–80	25–45	10–25
	67–72	Sandy loam	SM, ML	A-4	0	90–100	90–100	70–100	35–60	25–35	NP-10
Aquic Xerofluvents: Af	0–60	Variable	---	---	---	---	---	---	---	---	---
Arbuckle: AgC, AgD	0–17	Gravelly loam	GM	A-4	0–5	50–70	50–70	45–65	35–50	15–25	NP-55
	17–46	Gravelly clay loam	GC	A-6, A-7	0–5	50–70	50–65	45–65	35–50	35–45	15–25
	46–60	Very gravelly loam	GC, GM-GC	A-2	0–10	25–40	20–35	15–30	10–25	15–35	5–15
*Arnold: AkD, AkF, Am, Ar. For San Andreas part of Am, and Santa Ynez part of Ar, see those series.	0–48	Loamy fine sand	SM	A-2	0	90–100	85–100	60–80	20–30	---	NP
	48	Weathered bedrock.									
Arroyo Seco: AsA, AsB, AsC	0–42	Gravelly sandy loam	SM	A-2, A-4, A-1	0–10	60–80	50–75	40–65	20–40	10–25	NP-5
	42–60	Very gravelly coarse sandy loam.	GM	A-1	5–30	35–60	30–50	15–30	10–20	10–25	NP-5
AvA, AvB	0–42	Gravelly loam	SM	A-2, A-4	0–10	60–80	50–75	40–65	30–40	10–25	NP-5
	42–60	Very gravelly coarse sandy loam.	GM	A-1	5–30	35–60	30–50	15–30	10–20	10–25	NP-5
Ayar: AyD, AyE, AyF	0–45	Silty clay	MH	A-7	0	100	95–100	90–100	85–100	50–70	20–30
	45	Weathered bedrock.									
Badland: Ba. No estimates.											
Baywood: BbC	0–60	Sand	SP-SM, SM	A-3, A-2	0	100	100	50–80	5–30	---	NP
Chamise: CaD, CaE, CaF	0–19	Shaly loam	SM	A-2, A-4	0	70–95	60–90	30–65	25–45	25–35	NP-10
	19–40	Very shaly clay	GC, SC	A-2, A-7	0	50–80	30–60	25–50	25–45	40–55	15–30
	40–60	Shaly sandy loam	GC, SC, GM-GC, SM-SC	A-2, A-7, A-6	0	50–80	35–75	25–60	15–45	25–50	5–25

Chualar: CbA, CbB, CbC	0–21	Loam, sandy loam	SM, ML	A-4	0	100	90–100	65–100	35–60	15–25	NP–5
	21–44	Sandy clay loam	SM-SC, SC	A-4, A-6	0	80–100	75–100	65–85	35–50	20–30	5–15
	44–59	Gravelly sandy loam	SM, GM	A-2, A-1	0	50–80	45–70	35–50	20–35	15–25	NP–5
	59–80	Gravelly coarse sand	SP-SM, GP-GM	A-1	0	50–80	45–75	20–35	5–10	------	NP
*Cieneba: CcG, Cd, Ce. For Sur part of Ce, see Sur series. No estimates for Rock outcrop part of Cd and Ce.	0–11	Gravelly sandy loam	SM	A-1, A-2, A-4	0	60–90	50–75	35–50	15–40	15–30	NP–5
	11	Weathered bedrock.									
Clear Lake:											
Cf	0–33	Clay, silty clay loam	CH	A-7	0	100	100	95–100	85–100	50–70	25–45
	33–62	Clay, silty clay	CH	A-7	0	100	100	95–100	85–100	50–70	25–45
Cg	0–33	Clay	CL, CH	A-7	0	100	95–100	90–100	80–95	40–60	20–30
	33–54	Silt loam	CL	A-6	0	100	100	90–100	80–90	30–40	10–15
	54–62	Loamy very fine sand	SM	A-4	0	100	90–100	75–90	35–45	------	NP
*Climara: ChE, ChF, Ck. For Montara part of Ck, see Montara series.	0–40	Clay	CL, CH	A-7	0–10	95–100	80–95	80–90	70–85	40–60	20–30
	40	Unweathered bedrock.									
Coastal beaches: Cm. No estimates.											
Cropley: CnA, CnC	0–69	Silty clay	CL, CH	A-7	0	100	95–100	95–100	90–95	40–60	15–30
Danville: DaA, DaC	0–18	Sandy clay loam	SC, CL	A-6	0	80–100	70–100	65–85	45–55	20–35	10–20
	18–38	Clay	CL, CH	A-7	0	80–100	70–100	65–85	55–70	40–60	20–30
	38–67	Gravelly sandy clay loam	SC	A-2, A-6	0	75–100	65–70	50–70	25–40	20–30	10–20
Diablo: DbD, DbE, DbF	0–53	Clay	CL, CH	A-7	0	100	95–100	95–100	85–100	45–75	20–40
	53	Unweathered bedrock.									
Diablo part of LcG2	0–48	Clay	CL, CH	A-7	0	100	95–100	95–100	85–100	45–65	20–40
	48	Unweathered bedrock.									
Dibble:											
DcC	0–3	Loam	CL, CL-ML	A-4	0	100	95–100	70–95	60–90	20–40	5–10
	3–40	Clay loam, clay	CH, CL	A-7	0	100	95–100	85–100	80–100	40–60	20–30
	40	Weathered bedrock.									
DdB, DdE, DdF	0–3	Silt loam	CL, CL-ML	A-4	0	100	95–100	70–95	60–90	20–40	5–10
	3–40	Clay loam, clay	CH, CL	A-7	0	100	95–100	85–100	80–100	40–60	20–30
	40	Weathered bedrock.									
Docas: DeA, DeC	0–60	Silty clay loam	CL	A-6	0	100	100	95–100	85–100	30–40	10–20
Dune land: Df. No estimates.											
Elder:											
EaA	0–37	Sandy loam	SM	A-2, A-4	0	80–100	75–100	50–70	25–50	10–20	NP–5
	37–52	Fine gravelly sandy loam	SM	A-1, A-2	0	60–80	55–75	45–65	15–35	10–20	NP–5
	52–73	Fine gravelly loamy coarse sand.	SP-SM	A-1	0–15	60–80	55–75	35–50	5–10	------	NP
EbC	0–40	Very fine sandy loam	ML	A-4	0	80–100	75–100	60–75	50–60	20–30	NP–5
	40	Unweathered bedrock.									

See footnote at end of table.

TABLE 6.—*Estimated engineering properties and classifications*—Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments >3 inches	Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				*Pct*					*Pct*	
Elder—Con.											
EcA	0–40	Loam	ML, CL-ML, CL	A–4	0	100	95–100	70–80	60–70	20–30	NP–10
	40–60	Very gravelly sand, very cobbly sand.	GW, GP	A–1	20–60	25–45	15–35	10–25	0–5	---	NP
Elkhorn: EdB, EdC, EdD	0–26	Fine sandy loam	SM	A–2, A–4	0	100	95–100	75–90	25–40	10–25	NP–5
	26–46	Sandy clay loam	SC	A–6	0	100	95–100	75–90	35–50	25–40	10–15
	46–63	Fine sandy loam	SM, SM-SC, SC	A–2, A–4	0	90–100	85–100	70–90	25–40	10–25	NP–10
Elkhorn variant: EeD, EeE.	0–17	Fine sandy loam	SM	A–4	0	100	95–100	75–90	35–50	10–25	NP–5
	17–25	Clay loam	CL	A–6	0	100	95–100	85–95	75–85	30–40	10–20
	25	Unweathered bedrock.									
Fluvents, stony: Fa	0–60	Stratified sandy loam to cobbly sand.	SP, SM	A–1, A–2	15–60	70–90	70–90	35–55	0–20	---	NP
*Gamboa: Ga. For Sur part, see Sur series. For Junipero part, see JaF in Junipero series.	0–59	Very gravelly fine sandy loam.	GP-GM, GM	A–1	5–25	25–40	15–35	10–30	5–20	10–25	NP–5
	59	Unweathered bedrock.									
*Garey: GbC, GbE, GbF2, Gc. For Oceano part of Gc, see Oceano series.	0–30	Sandy loam	SM	A–4	0	100	95–100	75–90	35–50	20–30	NP–5
	30–56	Sandy loam	SM	A–4	0	100	100	80–95	35–50	20–30	NP–5
	56–64	Loamy sand	SM, SP-SM	A–2	0	100	100	50–65	15–30	---	NP
*Gaviota: GdE, GdF, GeE, GeG. For San Andreas part of GeE, GeG, see San Andreas series.	0–12	Sandy loam	SM, ML	A–4, A–2	0–5	75–100	70–100	55–95	30–65	20–35	NP–10
	12	Unweathered bedrock.									
Gazos: GfE, GfF	0–29	Silt loam, silty clay loam	CL-ML, CL	A–4	0	60–100	55–95	50–85	40–70	20–30	5–10
	29	Unweathered bedrock	GM-GC, GC								
Gilroy: GgE, GgG2	0–11	Gravelly loam	SM-SC, SC, CL-ML, CL	A–4, A–6	0–5	75–90	65–80	55–70	40–60	20–35	5–15
	11–25	Gravelly clay loam	CL	A–6, A–7	0	70–90	65–80	55–70	50–60	30–45	10–25
	25	Unweathered bedrock.									
Gloria: GhC, GhD, GhF	0–16	Sandy loam	SM	A–4	0	100	80–100	60–90	35–50	20–40	NP–5
	16–23	Clay	CL, CH	A–7	0	100	80–100	65–90	60–80	40–60	15–30
	23–69	Indurated hardpan.									
Gorgonio: GkB	0–22	Sandy loam	SM	A–2, A–4	0–5	70–90	55–85	45–70	25–45	---	NP
	22–63	Gravelly loamy sand, loamy sand.	SP-SM, SM	A–1, A–2	0–30	70–90	55–80	45–65	5–15	---	NP

Greenfield: GmB, GmC, GmD.	0–22	Fine sandy loam	SM, SM-SC, SC	A-2, A-4	0	95–100	80–100	60–75	25–45	10–25	NP–10
	22–52	Sandy loam	SM-SC, SC	A-2, A-4	0	80–100	70–100	60–80	25–45	20–30	5–15
	52–64	Fine sand	SM	A-2	0	70–100	60–100	50–70	15–35	-------	NP
Haire: HaE	0–11	Loam	CL	A-6, A-7	0	85–100	80–100	70–90	50–70	30–50	10–30
	11–25	Clay	CL, CH	A-7	0	100	90–100	85–100	70–95	40–60	20–30
	25–41	Gravelly sandy clay loam	GC, SC	A-2, A-6 A-7	0–30	55–80	40–65	40–60	30–45	30–50	10–30
	41	Weathered bedrock.									
Hanford: HbB	0–70	Gravelly sandy loam, gravelly loamy coarse sand.	SM, SP-SM	A-1, A-2	0	70–85	50–75	30–50	10–35	15–25	NP–5
Henneke: HcF	0–15	Clay loam	SC, GC	A-2	30–70	50–70	40–60	25–35	15–25	40–60	15–35
	15	Unweathered bedrock.									
*Junipero:											
JaF	0–5	Loamy sand	SM	A-2, A-4	0–15	85–100	80–95	70–95	30–50	-------	NP
	5–30	Weathered bedrock.	SM	A-1, A-2, A-4	0–30	60–100	50–95	40–75	15–35	20–30	NP–5
	30	Weathered bedrock.									
JbG, Jc. For Sur part of Jc, see Sur series.	0–5	Sandy loam	SM	A-2, A-4	0–15	85–100	80–95	70–95	30–50	-------	NP
	5–30	Gravelly sandy loam	SM	A-1, A-2	0–30	60–100	50–95	40–75	15–35	20–30	NP–5
	30	Weathered bedrock.									
*Linne:											
LaD, LaE, LaF, LbD, LbE, LcE, LcF. For Diablo part of LbD, LbE, LcF, see DbD in Diablo series. For Shedd part of LcE and LcF, see SmE in Shedd series.	0–36	Silty clay loam	CL	A-6, A-7	0	90–100	80–100	80–95	70–85	30–50	20–30
	36	Weathered bedrock.									
LcF2, LcG2. For Shedd part, see Shedd series. For Diablo part of LcG2, see Diablo series.	0–30	Silty clay loam	CL	A-6, A-7	0	90–100	80–100	80–95	70–85	30–50	20–30
	30	Weathered bedrock.									
Lockwood:											
LdA, LdC	0–40	Loam	CL	A-6	0	85–100	75–95	75–90	70–80	25–40	10–25
	40–82	Shaly clay loam	GC, CL	A-6, A-7	0	45–80	40–75	40–75	35–60	35–50	20–30
LeA, LeC, LeD	0–40	Shaly loam	GC, CL	A-6	0	55–80	50–75	45–70	40–60	25–40	10–25
	40–82	Shaly clay loam	GC, CL	A-6, A-7	0	45–80	40–75	40–75	35–60	35–50	20–30
LgA	0–40	Shaly loam	GC, CL	A-6	0	60–80	50–75	45–70	35–55	20–40	10–20
	40–82	Shaly clay loam	GC, CL	A-6, A-7, A-2	0	45–80	35–75	30–75	25–60	30–50	10–30
Lopez: LhE	0–4	Shaly loam	GM	A-1, A-2	0–15	35–65	35–50	30–40	20–35	30–50	5–15
	4–11	Shaly silt loam	GM	A-2	0–15	25–50	20–50	20–45	15–35	30–50	5–15
	11	Unweathered bedrock.									
Los Gatos: LkF, LkG	0–25	Gravelly loam	SC, GC	A-6	0	55–80	50–75	45–70	35–50	25–40	10–25
	25–36	Gravelly sandy clay loam	CL, SC	A-6	0	70–100	60–85	60–80	35–65	30–40	15–25
	36	Unweathered bedrock.									

See footnote at end of table.

TABLE 6.—*Estimated engineering properties and classifications*—Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >3 inches	Percentage passing sieve number— 4	10	40	200	Liquid limit	Plasticity index
	In				*Pct*					*Pct*	
*Los Osos: LmD, LmE, LmF, LmG, Ln. For Millsholm part of Ln, see Millsholm series.	0–11	Clay loam	CL	A-6, A-7	0	95–100	90–100	80–100	70–95	30–50	10–25
	11–31	Clay	CL	A-6, A-7	0	95–100	90–100	90–100	80–95	30–50	15–30
	31	Unweathered bedrock.									
*McCoy: MaE, MaF, MaG, MbE, MbG. For Gilroy part of MbE and MbG, see Gilroy series.	0–18	Clay loam	CL	A-6	0	100	90–100	80–95	70–85	25–35	10–20
	18–27	Clay loam	CL	A-6, A-7	0	100	90–100	80–95	70–85	35–45	15–25
	27	Weathered bedrock.									
McCoy variant: McG	0–17	Gravelly loam	SM, SC, SM-SC	A-2	0–25	70–80	50–65	35–50	25–35	10–20	NP–10
	17–53	Very stony clay loam, extremely stony clay loam.	GC	A-2, A-6	10–65	50–70	45–65	35–50	25–40	20–40	10–20
	53	Unweathered bedrock.									
*McMullin: Md. For Plaskett part, see Plaskett series.	0–7	Gravelly loam	SM	A-4, A-2	0–15	70–80	65–75	45–65	25–50	20–30	NP–5
	7–15	Gravelly loam	CL	A-6	0–15	75–95	65–75	60–75	50–60	30–40	10–15
	15	Unweathered bedrock.									
Metz:											
Me	0–12	Loamy sand	SM	A-2	0	100	100	50–70	15–35		NP
	12–99	Stratified sand to very fine sandy loam.	SM	A-2	0	100	100	60–80	15–35		NP
Mf	0–12	Fine sandy loam	SM, ML	A-4	0	100	100	70–85	35–70	15–25	NP–5
	12–99	Stratified sand to very fine sandy loam.	SM	A-2	0	100	100	60–80	15–35		NP
Mg:											
Coarser part	0–12	Loamy sand	SM	A-2	0	100	100	50–70	15–35		NP
	12–99	Stratified sand to very fine sandy loam.	SM	A-2	0	100	100	60–80	15–35		NP
Finer part	0–12	Fine sandy loam	SM, ML	A-4	0	100	100	70–85	35–70	15–25	NP–5
	12–99	Stratified sand to very fine sandy loam.	SM	A-2	0	100	100	60–80	15–35		NP
*Millsholm: MhG, Mk, Mm. For Alo part of Mk, see Alo series. For Gazos part of Mm, see Gazos series.	0–17	Loam	CL	A-6, A-7	0	80–100	75–100	70–100	50–85	30–50	15–25
	17	Unweathered bedrock.									
Mocho:											
MnA	0–68	Silt loam	CL-ML, CL	A-4, A-6	0	80–100	75–100	70–95	60–80	20–40	5–15
MoA, MoC	0–68	Silty clay loam, silt loam	CL	A-6, A-7	0	80–100	75–100	70–100	70–85	30–50	15–25
Montara: Mp. No estimates for Rock outcrop part.	0–10	Clay loam	CL	A-6, A-7	5–20	90–100	75–100	75–90	70–80	30–50	10–25
	10	Unweathered bedrock.									

*Nacimiento: NaD, NaE, NaF, NaG, NbF, NbG. For Los Osos part of NbF and NbG, see Los Osos series. For San Benito part, see San Benito series.	0–31	Silty clay loam	CL	A-6, A-7	0	80–100	75–100	70–95	65–85	30–45	10–30
	31	Weathered bedrock.									
Narlon: NcC, NcE	0–13	Loamy fine sand	SM	A-2, A-4	0	85–100	75–95	50–90	15–40	-------	NP
	13–53	Clay	CH	A-7	0	100	95–100	80–100	70–85	50–70	25–40
	53	Weathered bedrock.									
Oceano: OaD	0–80	Loamy sand	SP-SM, SM	A-2, A-3	0	100	100	50–65	5–15	-------	NP
Pacheco:											
Pa	0–65	Clay loam	CL	A-6, A-7	0	100	90–100	80–100	75–85	30–50	15–25
Pb	0–22	Silty clay loam	CL	A-6, A-7	0	100	100	90–100	75–85	30–50	15–25
	22–47	Loam	CL-ML, CL	A-4, A-6	0	100	100	75–95	60–75	10–30	5–15
	47–65	Silty clay loam	CL	A-6, A-7	0	100	100	90–100	75–85	30–50	15–25
Parkfield: PcC, PcE	0–14	Clay	CL	A-6, A-7	0	90–100	80–100	70–90	60–80	30–45	15–30
	14–24	Clay	CL	A-6, A-7	0	70–100	70–95	60–90	50–80	30–45	15–30
	24	Unweathered bedrock.									
Pfeiffer: PdC, PdD, Pe. Rock outcrop part of Pe not estimated.	0–6	Fine sandy loam	SM	A-4	0	90–100	80–90	60–80	35–50	15–30	NP–5
	6–60	Gravelly coarse sandy loam, gravelly sandy loam.	SP-SM, SM, GP-GM, GM	A-1, A-2	0–5	40–90	35–75	20–60	10–30	15–30	NP–5
	60	Weathered bedrock.									
Pico: Pf	0–55	Fine sandy loam	SM	A-4	0	90–100	75–100	70–85	35–50	15–25	NP–5
	55–72	Stratified sand to silty clay loam.	SM	A-1, A-2	0	90–100	75–100	30–50	10–35	-------	NP
Pinnacles:											
PgE	0–17	Coarse sandy loam, gravelly sandy loam.	SM, GM	A-2	0–15	55–75	50–70	30–50	15–35	15–25	NP–5
	17–30	Gravelly clay	GC, CH	A-2, A-7	0–25	55–90	50–85	30–70	25–60	40–50	20–30
	30	Weathered bedrock.									
PhG2	0–12	Stony sandy loam	SM, GM	A-1, A-2, A-4	10–40	55–90	50–80	30–60	15–50	15–25	NP–5
	12–25	Stony sandy clay	GC, CH	A-2, A-7	10–40	55–90	50–85	30–70	25–60	40–60	20–30
	25	Weathered bedrock.									
Pinnacles variant: PkE, PkF	0–24	Coarse sandy loam	SM	A-4	0–5	75–95	65–95	55–80	35–50		NP
	24–32	Gravelly clay	GC	A-2	0–10	35–55	30–50	20–40	15–35	40–50	20–30
	32–60	Very gravelly sandy clay loam.	GC, GM-GC, SC, SM-SC	A-2, A-1	0–10	30–60	20–40	10–30	5–15	20–40	5–15
Pits and dumps: Pm. No estimates.											
*Placentia: PnA, PnC, PnD, PnE, PoE. For Arbuckle part of PoE, see Arbuckle series.	0–13	Sandy loam	SM, ML	A-4	0–5	90–100	85–100	60–95	35–65	15–25	NP–5
	13–36	Clay	CL, CH	A-6, A-7	0	90–100	60–100	60–95	50–80	35–60	20–40
	36–58	Sandy clay loam	SC	A-6, A-2	0	90–100	60–100	60–95	25–50	20–40	10–25
	58–68	Gravelly sandy loam	SM, SM-SC	A-4	0	70–90	60–90	55–80	25–45	15–20	NP–5

See footnote at end of table.

TABLE 6.—*Estimated engineering properties and classifications*—Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >3 inches	Percentage passing sieve number—: 4	10	40	200	Liquid limit	Plasticity index
	In				*Pct*					*Pct*	
*Plaskett: Pp. For Reliz part, see Reliz series.	0–10	Very shaly loam	GM, GP-GM, SM, SP-SM	A–1	15–40	30–65	20–55	15–50	5–25	-------	NP
	10	Unweathered bedrock.									
*Psamments and Fluvents, flooded: Pr, Ps.											
Psamments part	0–60	Stratified sands	SP, SP-SM, SM	A–1, A–2, A–3	0–20	55–100	50–100	25–60	0–15	-------	NP
Fluvents part	0–60	Stratified gravel and sands	GP, GW	A–1	0–20	25–50	20–50	10–25	0–5	-------	NP
Reliz	0–12	Shaly clay loam	GM-GC, GC	A–2, A–4, A–6	0–15	40–65	35–55	30–50	25–40	25–40	5–20
	12	Unweathered bedrock.									
Rincon: RaA, RaC, RaD, RaE.	0–14	Clay loam	CL	A–6, A–7	0	100	95–100	90–100	80–100	30–50	10–30
	14–49	Clay	CL, CH	A–6, A–7	0	100	95–100	90–100	75–100	35–60	15–35
	49–60	Clay loam	CL	A–6	0	90–100	85–100	80–100	55–80	30–40	15–25
Rindge: Rb	0–60	Sapric material	Pt	A–8	-------	-------	-------	-------	-------	-------	-------
*Rock outcrop: Rc. No estimates for Rock outcrop. For Xerorthents, shallow, see series.											
Salinas:											
SaA	0–5	Loam	ML, CL-ML	A–4, A–6	0	100	95–100	90–100	60–80	20–40	5–10
	5–75	Stratified silty clay loam to fine sandy loam.	CL	A–6	0	100	95–100	90–100	60–70	30–45	10–30
SbA, SbC	0–5	Clay loam	CL	A–6, A–7	0	100	95–100	90–100	75–85	35–50	15–25
	5–75	Stratified silty clay loam to fine sandy loam.	CL	A–6	0	100	95–100	90–100	60–70	30–45	10–20
San Andreas: ScE, ScG	0–22	Fine sandy loam	SM, ML	A–4	0	90–100	80–100	70–95	35–60	10–40	NP–10
	22	Weathered bedrock.									
San Benito: SdF, SdG	0–55	Clay loam, silt loam	CL	A–6, A–7	0	100	90–100	80–95	70–85	35–45	15–25
	55	Weathered bedrock.									
San Timoteo: SeG	0–24	Gravelly loam	SM, SM-SC, SC	A–4	0	65–90	50–75	45–75	35–50	20–30	NP–10
	24	Weathered bedrock.									
*Santa Lucia: SfD, SfE, SfF, Sg. For Reliz and Lopez parts of Sg, see those series.	0–24	Shaly clay loam	GM	A–2	0	30–65	25–50	25–40	20–35	40–55	10–15
	24	Unweathered bedrock.									

Santa Ynez: ShC, ShD, ShD2, ShE.	0–18	Fine sandy loam	SM	A-2, A-4	0	80–100	75–100	60–70	25–45	20–30	NP-5
	18–43	Clay, clay loam	CL	A-6, A-7	0	80–100	75–100	65–95	60–80	30–50	15–30
	43–61	Sandy clay loam	SC	A-6	0	80–100	75–100	65–85	35–50	20–40	10–20
Shedd: SmG3	0–30	Silt loam	ML	A-4, A-6	0	100	100	95–100	85–100	30–40	5–15
	30	Weathered bedrock.									
SnD, SnE, SnF2	0–30	Silty clay loam	CL	A-6, A-7	0	100	100	95–100	85–100	30–50	10–25
	30	Weathered bedrock.									
Sheridan: SoD, SoE, SoG	0–39	Coarse sandy loam	SM	A-2, A-1	0–10	90–100	75–90	25–60	15–35	--------	NP
	39	Weathered bedrock.									
*Snelling: SpD, SpE2. For Greenfield part, see Greenfield series.	0–13	Sandy loam	SM, ML	A-4	0	90–100	75–100	65–80	35–60	10–30	NP-5
	13–46	Sandy clay loam	SC, CL	A-6	0	90–100	85–100	70–90	40–60	20–40	10–20
	46–58	Sandy loam	SM	A-2, A-4	0	90–100	75–100	65–80	30–40	10–30	NP-5
Sorrento: SrA, SrC	0–25	Clay loam	CL	A-6, A-7	0	100	95–100	90–100	75–85	30–50	10–25
	25–60	Loam	ML, CL-ML	A-4	0	100	95–100	75–95	60–80	20–40	5–10
*Sur: Ss, St. For Junipero part of Ss, see JbG and Jc in Junipero series. For Plaskett part of St, see Plaskett series.	0–24	Stony sandy loam	GP-GM, GM	A-1	5–40	50–60	45–55	30–50	10–20	--------	NP
	24	Unweathered bedrock.									
Tangair: TaC	0–62	Fine sand	SM, SP-SM	A-1, A-2, A-3	0	80–100	75–100	40–80	5–30	--------	NP
Tujunga: TbB	0–60	Fine sand	SP-SM, SM	A-1, A-2, A-3	0	90–100	75–100	40–70	5–20	--------	NP
Vista: VaD, VaE, VaG, Vb. No estimates for Rock outcrop part of Vb.	0–23	Coarse sandy loam	SM	A-2	0	90–100	80–95	45–65	20–35	--------	NP
	23	Weathered bedrock.									
*Xererts-Xerolls complex: Xa.											
Xererts part	0–48	Clay	CL, CH	A-7	0	100	100	95–100	90–100	40–60	20–30
Xerolls part	0–48	Clay loam, silty clay loam	CL	A-6, A-7	0–20	80–100	80–100	75–100	50–95	30–50	10–25
Xerorthents, sandy: Xb	0–60	Sand, loamy sand	SM	A-2, A-4	0–5	90–100	75–85	40–55	25–45	--------	NP
Xerorthents, loamy: Xc	0–60	Loam, clay loam	CL	A-6	0–5	90–100	85–100	85–95	75–85	30–40	10–20
Xerorthents, dissected: Xd.	0–60	Variable.									
Xerorthents, shallow	0–8	Variable.									
	8	Unweathered and weathered bedrock.									

[1] NP means nonplastic.

survey area. These estimates are ranges in values most likely to exist in areas where the soil is mapped.

Most soils have, within the upper 5 or 6 feet, horizons of contrasting properties. Information is presented for each of these contrasting horizons. Depth to the upper and lower boundaries of each horizon in a typical profile of each soil is indicated. More information about the range in depth and in properties at each horizon is given for each soil series in the sections "Soil Maps for Detailed Planning" and "Formation, Morphology, and Classification of Soils."

Texture is described in table 6 in standard terms used by the United States Department of Agriculture. These terms are defined according to the percentage of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains gravel or other particles coarser than sand, an appropriate modifier is added, for example, "gravelly loam." Other texture terms used by USDA are defined in the Glossary.

The two systems commonly used in classifying soils for engineering use are the Unified soil classification system (*3*) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO) (*2*). In table 6 soils in the survey area are classified according to both systems.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the percentage less than 3 inches in diameter, plasticity index, liquid limit, and organic-matter content. Soils are grouped into 15 classes—eight classes of coarse grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes have a dual classification symbol, for example CL–ML.

The AASHTO system classifies soils according to those properties that affect their use in highway construction and maintenance. In this system a mineral soil is classified in one of seven basic groups ranging from A–1 through A–7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A–1 are coarse grained and low in content of fines. At the other extreme, in group A–7, are fine grained soils. Highly organic soils are classified as A–8 on the basis of visual inspection.

When laboratory data are available, the A–1, A–2, and A–7 groups are further classified as follows: A–1–a, A–1–b, A–2–4, A–2–5, A–2–6, A–2–7, A–7–5, and A–7–6. As an additional refinement, the suitability of soils for subgrade material can be indicated by a group index number. These numbers range from 0 for the best subgrade material to 20 or more for the poorest. The AASHTO classification for soils tested in the survey area, with group index numbers in parentheses, is given in table 8. The estimated classification, without group index numbers, is given in table 6. Also in table 6 is the percentage, by weight, of cobbles or rock fragments more than 3 inches in diameter estimated for each major horizon. These estimates are determined largely by observing volume percentage in the field and then converting it, by formula, to weight percentage.

Percentage of the soil material less than 3 inches in diameter that passes each of four standard sieves is estimated for each major horizon. The estimates are based on tests of soils that were sampled in the survey area and in nearby areas and on field estimates from many borings made during the survey.

Liquid limit and plasticity index indicate the effect of water on the strength and consistency of soil. These indexes are used in both the Unified and the AASHTO soil classification systems. They are also used as indicators in making general predictions of soil behavior. Range in liquid limit and plasticity index are estimated on the basis of test data from the survey area or from nearby areas and on observations of the many soil borings made during the survey.

Physical and chemical properties

Table 7 shows estimated values for several soil characteristics and features that affect behavior of soils in engineering uses. These estimates are given for each major horizon, at the depths indicated, in the representative profile of each soil. The estimates are based on field observations and on test data for these and similar soils.

Permeability is estimated on the basis of known relationships between the soil characteristics observed in the field, particularly soil structure, porosity, and gradation or texture, that influence the downward movement of water in the soil. The estimates are for water movement in a vertical direction when the soil is saturated. Not considered in the estimates are lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in the planning and design of drainage systems, in evaluating the potential of soils for septic tank systems and other waste disposal systems, and in many other aspects of land use and management.

Available water capacity is rated on the basis of soil characteristics that influence the ability of the soil to hold water and make it available to plants. Important characteristics are content of organic matter, soil texture, and soil structure. Shallow-rooted plants are not likely to use the available water from the deeper soil horizons. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design of irrigation systems.

Soil reaction is expressed as the range in pH values. The range in pH of each major horizon is based on many field checks. For many soils, the values have been verified by laboratory analyses. Soil reaction is important in selecting the crops and ornamental or other plants to be grown, in evaluating soil amendments for fertility and stabilization, and in evaluating the corrosivity of soils.

Salinity is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25° C. Estimates are based on field and laboratory measurements at representative sites on nonirrigated soils. The salinity of individual irrigated fields is largely affected by the quality of the irrigation water and the irrigation practices. Hence, the salinity of in-

dividual fields can differ greatly from the value given in table 7. Salinity affects the suitability of a soil for crop production, its stability when used as a construction material, and its potential to corrode metal and concrete.

Shrink-swell potential depends mainly on the amount and kind of clay in the soil. Laboratory measurements of the swelling of undisturbed clods were made for many soils. For others it was estimated on the basis of the kind of clay and on measurements of similar soils. Size of imposed loadings and the magnitude of changes in soil moisture content are also important factors that influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A *high* shrink-swell potential indicates that special design and added expense may be required if the planned use of the soil will not tolerate large volume changes.

Risk of corrosion, as used in table 7, pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil material. The rating of soils for corrosivity to concrete is based mainly on the sulfate content, soil texture, and acidity. Protective measures for steel and more resistant concrete help to prevent or minimize damage resulting from the corrosion. Installations of steel that intersect soil boundaries or soil horizons are more susceptible to corrosion than installations entirely within one kind of soil or within one soil horizon.

Erosion factors are used to predict the erodibility of a soil and its tolerance to erosion in relation to specific kinds of land use and treatment. The soil erodibility factor (K) is a measure of the susceptibility of the soil to erosion by water. Soils having the highest K values are the most erodible. K values range from 0.10 to 0.64. To estimate annual loss per acre, the K value of a soil is modified by factors representing plant cover, grade and length of slope, management practices, and climate. The soil-loss tolerance factor (T) is the maximum rate of soil erosion, whether from rainfall or soil blowing, that can occur without reducing crop production or environmental quality. The rate is expressed in tons of soil loss per acre per year.

Soil test data

Table 8 contains engineering test data for some of the major soil series in Monterey County. The tests were made to help evaluate the soils for engineering purposes. The engineering classifications are based on data obtained by mechanical analyses and by tests to determine liquid limit and plastic limit. The mechanical analyses were made by combined sieve and hydrometer methods.

Moisture-density data are important in earthwork. If a soil material is compacted at successively higher moisture content, assuming that the compactive effort remains constant, the density of the compacted material increases until the *optimum moisture content* is reached. After that, density decreases with increase in moisture content. The highest dry density obtained in the compactive test is termed *maximum dry density.* As a rule, maximum strength of earthwork is obtained if the soil is compacted to the maximum dry density.

Tests to determine liquid limit and plastic limit measure the effect of water on the consistence of soil material, as explained in table 6.

Soil and water features

Features that relate to runoff or infiltration of water, to flooding, to grading and excavation, and to subsidence and frost action of each soil are indicated in table 9. This information is helpful in planning land uses and engineering projects that are likely to be affected by the amount of runoff from watersheds, by flooding and a seasonal high water table, by the presence of bedrock or a cemented pan in the upper 5 or 6 feet of the soil, by subsidence, or by frost action.

Hydrologic groups are used to estimate runoff after rainfall. Soil properties that influence the minimum rate of infiltration into the bare soil after prolonged wetting are depth to a water table, water intake rate and permeability after prolonged wetting, and depth to layers of slowly permeable or very slowly permeable soil.

Flooding is rated in general terms that describe the frequency and duration of flooding and the period of the year when flooding is most likely to occur. The ratings are based on evidence in the soil profile of the effects of flooding, namely thin strata of gravel, sand, silt, or, in places, clay deposited by floodwater; irregular decrease in organic-matter content with increasing depth; absence of distinctive soil horizons that form in soils of the area that are not subject to flooding; local information about floodwater height and the extent and history of flooding. Most soils in low positions on the landscape where flooding is likely to occur are classified as fluvents at the suborder level or as fluventic subgroups. See the section "Classification of Soils."

The generalized description of flood hazards is of value in land use planning and provides a valid basis for land use restrictions. The soil data are less specific, however, than those provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

A seasonal high water table is the highest level of a zone more than 6 inches thick that remains saturated for a continuous period of more than 2 weeks during most years. The depth to a seasonal high water table applies to undrained soils. Estimates are based mainly on the relationship between grayish colors or mottles in the soil and the depth to free water observed during the course of the soil survey. Indicated are the depth to the seasonal high water table; the kind of water table, whether perched, artesian, or the upper part of the ground water table; and the months of the year that the high water commonly is present. Only those saturated zones above a depth of 5 or 6 feet are indicated.

Information about the seasonal high water table helps in assessing the need for specially designed foundations, the need for specific kinds of drainage systems, and the need for footing drains to insure dry basements. Such information is also needed to decide whether or not to construct basements and to determine

TABLE 7.—*Estimated physical and chemical properties*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil which may have different properties and limitations. For this reason it is necessary to follow carefully the instructions for referring to other series that appear in the first column. The symbol < means less than; > means more than. The erosion tolerance factor (T) is for the entire profile]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T
	In	*In/hr*	*In/in*	*pH*	*Mmhos/cm*					
*Alo: AaC, AaD, AaE, AaF, Ab. For Millsholm part of Ab, see Millsholm series.	0–36	0.06–0.2	0.14–0.17	6.1–8.4	<2	High	High	Low	0.24	2
	36									
Alviso: Ac, Ad	0–14	0.06–0.6	0.07–0.15	6.6–8.4	>2	Moderate	High	High		
	14–45	0.06–0.2	0.07–0.15	6.6–8.4	>2	High	High	High		
	45–60	2.0–20.0	0.03–0.07	6.1–8.4	>2	Low	High	High		
Antioch: AeA, AeC, AeD	0–21	0.6–2.0	0.11–0.18	5.1–6.0	<2	Low	Moderate	Low	0.43	2
	21–40	<0.06	0.01–0.02	6.6–8.4	<2	High	High	Low	0.28	
	40–67	0.06–0.2	0.01–0.02	7.4–8.4	<2	High	High	Low	0.43	
	67–72	0.2–0.6	0.01–0.02	7.9–8.4	<2	Low	High	Low	0.37	
Aquic Xerofluvents: Af	0–60				<2					
Arbuckle: AgC, AgD	0–17	0.6–2.0	0.08–0.13	5.6–7.3	<2	Low	Low	Moderate	0.28	5
	17–46	0.2–0.6	0.14–0.17	5.6–7.8	<2	Moderate	Moderate	Moderate	0.24	
	46–60	0.2–0.6	0.04–0.08	5.6–7.8	<2	Low	Low	Moderate	0.10	
*Arnold: AkD, AkF, Am, Ar. For San Andreas part of Am, see San Andreas series. For Santa Ynez part of Ar, see Santa Ynez series.	0–48	6.0–20.0	0.05–0.09	5.1–7.3	<2	Low	Moderate	Moderate	0.15	4
	48									
Arroyo Seco: AsA, AsB, AsC, AvA, AvB.	0–42	2.0–6.0	0.06–0.10	6.1–8.4	<2	Low	Moderate	Low	0.17	5
	42–60	2.0–6.0	0.03–0.07	6.6–8.4	<2	Low	Moderate	Low	0.10	
Ayar: AyD, AyE, AyF	0–45	0.06–0.2	0.14–0.17	7.4–8.4	<2	High	High	Low	0.28	3
	45									
Badland: Ba. No estimates.										
Baywood: BbC	0–60	6.0–20.0	0.05–0.11	5.1–7.8	<2	Low	High	Moderate	0.15	5
Chamise: CaD, CaE, CaF	0–19	0.6–2.0	0.11–0.21	5.1–7.3	<2	Low	Moderate	High	0.24	2
	19–40	0.2–0.6	0.10–0.15	4.5–6.0	<2	Moderate	High	High	0.17	
	40–60	0.2–0.6	0.12–0.16	4.5–6.5	<2	Moderate	High	High	0.17	
Chualar: CbA, CbB, CbC	0–21	0.6–2.0	0.15–0.18	6.1–7.8	<2	Low	Low	Low	0.28	3
	21–44	0.2–0.6	0.13–0.16	6.1–8.4	<2	Moderate	Moderate	Low	0.32	
	44–59	0.2–0.6	0.07–0.13	6.1–8.4	<2	Low	High	Low	0.24	
	59–80	2.0–6.0	0.03–0.07	6.6–8.4	<2	Low	High	Low	0.10	
*Cieneba: CcG, Cd, Ce. No estimates for Rock outcrop part of Cd and Ce.	0–11	2.0–6.0	0.07–0.13	5.6–7.8	<2	Low	Low	Low	0.17	1
	11									

For Sur part of Ce, see Sur series.										
Clear Lake:										
Cf	0–33	0.06–0.2	0.10–0.16	6.1–7.3	<6	High	High	High	0.24	5
	33–62	0.06–0.2	0.10–0.16	6.1–8.4	<6	High	High	High	0.24	
Cg	0–33	0.06–0.2	0.13–0.16	6.1–8.4	<4	High	High	Low	0.24	5
	33–54	0.06–0.2	0.17–0.19	7.4–8.4	<2	Moderate	High	Low	0.24	
	54–62	0.6–2.0	0.09–0.12	7.9–8.4	<2	Low	High	Low	0.24	
*Climara: ChE, ChF, Ck	0–40	0.06–0.2	0.12–0.16	6.6–8.4	<2	High	High	Low	0.24	2
For Montara part of Ck, see Montara series.	40									
Coastal beaches: Cm. No estimates.										
Cropley: CnA, CnC	0–69	0.06–0.2	0.13–0.17	6.6–8.4	<2	High	High	Low	0.24	5
Danville: DaA, DaC	0–18	0.2–0.6	0.14–0.17	5.6–8.4	<2	Moderate	High	Moderate	0.28	5
	18–38	0.06–0.2	0.14–0.17	6.6–8.4	<2	High	High	Low	0.24	
	38–67	0.2–0.6	0.10–0.15	6.1–8.4	<2	Moderate	High	Low	0.15	
Diablo: DbD, DbE, DbF	0–53	0.06–0.2	0.14–0.19	6.1–8.4	<2	High	High	Low	0.24	3
	53									
Diablo part of LcG2	0–48	0.06–0.2	0.14–0.19	6.1–8.4	<2	High	High	Low	0.24	3
	48									
Dibble: DcC, DdB, DdE, DdF	0–3	0.6–2.0	0.14–0.20	5.6–6.1	<2	Moderate	Moderate	Moderate	0.55	2
	3–40	0.06–0.2	0.14–0.18	5.6–7.3	<2	High	High	Moderate	0.32	
	40									
Docas: DeA, DeC	0–60	0.2–0.6	0.17–0.21	7.9–8.4	<2	Moderate	High	Low	0.43	5
Dune land: Df. No estimates.										
Elder:										
EaA	0–37	0.6–2.0	0.10–0.15	5.6–7.8	<2	Low	Moderate	Moderate	0.32	5
	37–52	0.6–2.0	0.08–0.13	5.6–7.8	<2	Low	Moderate	Moderate	0.28	
	52–73	6.0–20.0	0.05–0.09	6.6–8.4	<2	Low	Moderate	Moderate	0.37	
EbC	0–40	0.6–2.0	0.15–0.18	5.6–7.8	<2	Low	Moderate	Moderate	0.43	5
	40									
EcA	0–40	0.6–2.0	0.13–0.15	5.6–7.8	<2	Low	Moderate	Moderate	0.37	3
	40–60	>20	0.01–0.02	7.4–7.8	<2	Low	Low	Low	0.10	
Elkhorn: EdB, EdC, EdD	0–26	2.0–6.0	0.11–0.15	5.6–7.3	<2	Low	Low	Low	0.32	5
	26–46	0.2–0.6	0.14–0.18	5.6–7.3	<2	Moderate	Moderate	Low	0.28	
	46–63	0.2–0.6	0.11–0.15	5.6–7.3	<2	Low	Low	Low	0.32	
Elkhorn variant: EeD, EeE	0–17	2.0–6.0	0.13–0.17	6.1–6.5	<2	Low	Low	Low	0.32	2
	17–25	0.06–0.2	0.15–0.20	6.1–6.5	<2	Moderate	High	Moderate	0.37	
	25									
Fluvents, stony: Fa	0–60	>2.0	0.03–0.06	6.6–7.3	<2	Low	Moderate	Low	0.17	5
*Gamboa: Ga	0–59	6.0–20.0	0.05–0.07	5.6–7.8	<2	Low	Moderate	Moderate	0.10	2
For Sur part, see Sur series. For Junipero part, see Junipero series.	59									

TABLE 7.—*Estimated physical and chemical properties*—Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion		Erosion factors	
							Uncoated steel	Concrete	K	T
	In	*In/hr*	*In/in*	*pH*	*Mmhos/cm*					
*Garey: GbC, GbE, GbF2, Gc. For Oceano part of Gc, see Oceano series.	0–30	0.6–2.0	0.10–0.13	5.1–6.5	<2	Low	High	Moderate	0.37	3
	30–56	0.2–0.6	0.04–0.09	6.1–7.3	<2	Low	High	Moderate	0.55	
	56–64	2.0–6.0	0.04–0.08	6.1–7.3	<2	Low	High	Moderate	0.28	
*Gaviota: GdE, GdF, GeE, GeG. For San Andreas part of GeE, and GeG, see San Andreas series.	0–12	2.0–6.0	0.07–0.16	5.6–7.3	<2	Low	Low	Low	0.43	1
	12									
Gazos: GfE, GfF	0–29	0.6–2.0	0.17–0.20	5.6–7.3	<2	Moderate	Moderate	Low	0.43	2
	29									
Gilroy: GgE, GgG2	0–11	0.6–2.0	0.10–0.16	6.1–7.3	<2	Moderate	Moderate	Low	0.28	2
	11–25	0.6–2.0	0.17–0.20	6.1–7.8	<2	Moderate	High	Low	0.32	
	25									
Gloria: GhC, GhD, GhF	0–16	2.0–6.0	0.18–0.20	5.1–7.3	<2	Low	High	Moderate	0.24	2
	16–23	<0.06	0.01–0.02	5.6–8.4	<2	High	High	Low	0.20	
	23–69									
Gorgonio: GkB	0–22	6.0–20.0	0.10–0.13	5.6–7.3	<2	Low	Moderate	Moderate	0.28	5
	22–63	6.0–20.0	0.05–0.08	5.6–7.3	<2	Low	Moderate	Moderate	0.15	
Greenfield: GmB, GmC, GmD	0–22	2.0–6.0	0.10–0.15	6.1–7.8	<2	Low	Moderate	Low	0.28	5
	22–52	2.0–6.0	0.12–0.16	6.6–8.4	<2	Low	Moderate	Low	0.32	
	52–64	2.0–6.0	0.10–0.14	7.4–8.4	<2	Low	High	Low	0.17	
Haire: HaE	0–11	0.2–0.6	0.15–0.20	5.6–7.3	<2	Moderate	Moderate	Low	0.32	2
	11–25	<0.06	0.01–0.02	4.5–5.5	<2	High	High	Moderate	0.20	
	25–41	0.06–0.2	0.00–0.01	4.5–5.5	<2	Low	High	High	0.20	
	41									
Hanford: HbB	0–70	2.0–6.0	0.08–0.13	6.1–7.8	<2	Low	Moderate	Low	0.17	5
Henneke: HcF	0–15	0.2–0.6	0.10–0.15	5.6–8.4	<2	Low	High	Moderate	0.24	1
	15									
*Junipero: JaF, JbG, Jc. For Sur part of Jc, see Sur series.	0–5	2.0–6.0	0.11–0.15	5.1–7.3	<2	Low	High	High	0.32	2
	5–30	2.0–6.0	0.11–0.15	5.1–7.3	<2	Low	High	High	0.43	
	30									
*Linne: LaD, LaE, LaF, LbD, LbE, LcE, LcF. For Diablo part of LbD, LbE, LcF, see Diablo series. For Shedd part of LcE and LcF, see SnE in Shedd series.	0–36	0.2–0.6	0.17–0.20	7.9–8.4	<2	Moderate	High	Low	0.28	2
	36									
LcF2, LcG2. For Shedd part, see Shedd series. For Diablo part of LcG2, see Diablo series.	0–30	0.2–0.6	0.17–0.20	7.9–8.4	<2	Moderate	High	Low	0.28	2
	30									

Lockwood:										
LdA, LdC	0–40	0.2–0.6	0.16–0.20	5.1–7.8	<2	Moderate	High	Low	0.37	5
	40–82	0.2–0.6	0.07–0.14	5.6–8.4	<2	High	High	Low	0.55	
LeA, LeC, LeD	0–40	0.6–2.0	0.11–0.16	5.1–7.8	<2	Moderate	High	Low	0.49	5
	40–82	0.2–0.6	0.07–0.14	5.6–8.4	<2	High	High	Low	0.55	
LgA	0–40	0.6–2.0	0.11–0.15	5.1–7.8	<2	Moderate	High	Low	0.37	5
	40–82	0.2–0.6	0.07–0.14	5.6–8.4	<2	Moderate	High	Low	0.43	
Lopez: LhE	0–4	0.6–2.0	0.10–0.14	5.1–6.0	<2	Low	Moderate	Moderate	0.15	1
	4–11	0.6–2.0	0.08–0.12	5.1–6.0	<2	Low	Moderate	Moderate	0.10	
	11									
Los Gatos: LkF, LkG	0–25	0.6–2.0	0.12–0.17	5.6–6.5	<2	Moderate	Moderate	Moderate	0.24	2
	25–36	0.2–0.6	0.14–0.20	5.6–6.5	<2	Moderate	Moderate	Moderate	0.37	
	36									
*Los Osos: LmD, LmE, LmF, LmG, Ln	0–11	0.2–0.6	0.17–0.21	6.1–7.3	<2	High	High	Moderate	0.32	2
For Millsholm part of Ln, see Millsholm series.	11–31	0.06–0.2	0.15–0.18	5.6–7.3	<2	High	High	Moderate	0.28	
	31									
*McCoy: MaE, MaF, MaG, MbE, MbG.	0–18	0.2–0.6	0.16–0.21	6.1–7.8	<2	Moderate	Moderate	Low	0.37	2
For Gilroy part of MbE and MbG, see Gilroy series.	18–27	0.2–0.6	0.15–0.20	6.1–8.4	<2	High	High	Low	0.43	
	27									
McCoy variant: McG	0–17	0.6–2.0	0.12–0.14	6.1–7.3	<2	Low	Moderate	Low	0.20	2
	17–53	0.2–0.6	0.10–0.16	6.1–7.3	<2	Low	Moderate	Low	0.10	
	53									
*McMullin: Md	0–7	0.6–2.0	0.10–0.15	5.6–6.5	<2	Low	Low	Moderate	0.17	1
For Plaskett part, see Plaskett series.	7–15	0.6–2.0	0.14–0.17	5.6–6.0	<2	Low	Moderate	Moderate	0.20	
	15									
Metz:										
Me	0–12	6.0–20.0	0.07–0.11	6.6–8.4	<2	Low	High	Low	0.17	5
	12–99	0.6–2.0	0.07–0.10	6.6–8.4	<2	Low	High	Low	0.15	
Mf	0–12	2.0–6.0	0.13–0.17	6.6–8.4	<2	Low	High	Low	0.28	5
	12–99	0.6–2.0	0.07–0.10	6.6–8.4	<2	Low	High	Low	0.15	
Mg:										
Loamy sand surface layer	0–12	6.0–20.0	0.07–0.11	6.6–8.4	<2	Low	High	Low	0.17	5
	12–99	0.6–2.0	0.07–0.10	6.6–8.4	<2	Low	High	Low	0.15	
Fine sandy loam surface layer	0–12	2.0–6.0	0.13–0.17	6.6–8.4	<2	Low	High	Low	0.28	5
	12–99	0.6–2.0	0.07–0.10	6.6–8.4	<2	Low	High	Low	0.15	
*Millsholm: MhG, Mk, Mm	0–17	0.6–2.0	0.17–0.21	5.6–7.3	<2	Moderate	Moderate	Low	0.43	1
For Alo part of Mk, see Alo series. For Gazos part of Mm, see Gazos series.	17									
Mocho:										
MnA	0–68	0.6–2.0	0.16–0.20	7.4–8.4	<2	Moderate	High	Low	0.43	5
MoA, MoC	0–68	0.2–0.6	0.18–0.21	7.4–8.4	<2	Moderate	High	Low	0.37	5
Montara: Mp	0–10	0.2–0.6	0.17–0.20	6.6–8.4	<2	Moderate	High	Low	0.32	1
No estimate for Rock outcrop part.	10									

TABLE 7.—*Estimated physical and chemical properties*—Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion		Erosion factors	
							Uncoated steel	Concrete	K	T
	In	*In/hr*	*In/in*	*pH*	*Mmhos/cm*					
*Nacimiento: NaD, NaE, NaF, NaG, NbF, NbG. For Los Osos and San Benito parts of NbF and NbG, see Los Osos and San Benito series.	0–31	0.2–0.6	0.17–0.19	7.9–8.4	<2	Moderate	High	Low	0.32	2
	31									
Narlon: NcC, NcE	0–13	2.0–6.0	0.08–0.12	5.1–6.5	<2	Low	High	High	0.17	2
	13–53	<0.06	0.01–0.02	4.5–5.5	<2	High	High	High	0.32	
	53									
Oceano: OaD	0–80	6.0–20.0	0.05–0.08	5.6–7.3	<2	Low	Moderate	Moderate	0.10	5
Pacheco:										
Pa	0–65	0.2–0.6	0.18–0.21	6.1–8.4	<15	Moderate	High	Low	0.43	5
Pb	0–22	0.2–0.6	0.17–0.21	6.1–8.4	<8	Moderate	High	Low	0.43	5
	22–47	0.2–0.6	0.15–0.18	7.4–8.4	<8	Moderate	High	Low	0.49	
	47–65	0.2–0.6	0.17–0.21	7.4–8.4	<4	Moderate	High	Low	0.43	
Parkfield: PcC, PcE	0–14	0.06–0.2	0.15–0.18	5.6–7.3	<2	High	High	Low	0.28	2
	14–24	0.06–0.2	0.13–0.18	6.6–8.4	<2	High	High	Low	0.28	
	24									
Pfeiffer: PdC, PdD, Pe. No estimates for Rock outcrop part of Pe.	0–6	2.0–6.0	0.12–0.16	6.1–7.3	<2	Low	Low	Low	0.20	3
	6–60	2.0–6.0	0.06–0.11	6.1–7.3	<2	Low	Low	Low	0.17	
	60									
Pico: Pf	0–55	2.0–6.0	0.13–0.15	7.4–8.4	<2	Low	High	Low	0.20	5
	55–72	0.6–2.0	0.03–0.05	7.9–8.4	<2	Low	High	Low	0.10	
Pinnacles:										
PgE	0–17	2.0–6.0	0.13–0.18	5.6–7.3	<2	Low	Moderate	Moderate	0.32	2
	17–30	0.06–0.2	0.04–0.08	4.5–6.0	<2	High	High	High	0.24	
	30									
PhG2	0–12	2.0–6.0	0.09–0.15	5.6–7.3	<2	Low	Moderate	Moderate	0.24	2
	12–25	0.06–0.2	0.04–0.08	4.5–6.0	<2	High	High	High	0.20	
	25									
Pinnacles variant: PkE, PkF	0–24	2.0–6.0	0.07–0.10	5.1–6.5	<2	Low	Moderate	High	0.28	1
	24–32	<0.06	0.02–0.03	4.5–5.5	<2	Moderate	High	High	0.15	
	32–60	0.06–0.2	0.01–0.02	4.5–5.5	<2	Low	High	High	0.10	
Pits and dumps: Pm. No estimates.										
Placentia: PnA, PnC, PnD, PnE, PoE. For Arbuckle part of PoE, see Arbuckle series.	0–13	0.6–2.0	0.17–0.19	5.6–7.8	<2	Low	Moderate	Low	0.32	1
	13–36	<0.06	0.01–0.02	6.6–8.4	<8	High	High	Low	0.24	
	36–58	<0.06	0.01–0.02	7.9–8.4	<8	High	High	Low	0.32	
	58–68	0.06–0.2	0.01–0.02	7.9–8.4	<8	Low	High	Low	0.37	

Plaskett: Pp	0–10	2.0–6.0	0.06–0.10	5.6–7.3	<2	Low	Moderate	Moderate	0.15	1
For Reliz part, see Reliz series.	10									
Psamments and Fluvents, flooded: Pr, Ps.										
Psamments part	0–60	>20	0.03–0.05	6.6–7.3	<2	Low	Low	Low	----	----
Fluvents part	0–60	>6.0	0.03–0.05	6.6–7.3	<2	Low	Low	Low	----	----
Reliz series	0–12	0.6–2.0	0.08–0.11	5.1–7.3	<2	Low	Moderate	Moderate	0.20	1
	12									
Rincon: RaA, RaC, RaD, RaE	0–14	0.2–0.6	0.17–0.21	6.1–7.3	<2	Moderate	Moderate	Moderate	0.37	4
	14–49	0.06–0.2	0.15–0.18	6.6–8.4	<2	High	High	Low	0.43	
	49–60	0.2–0.6	0.13–0.17	7.4–8.4	<2	Moderate	High	Low	0.37	
Rindge: Rb	0–60	6.0–20.0	0.26–0.30	4.5–6.5	<2	Very low	High	High	----	----
*Rock outcrop: Rc. No estimates for Rock outcrop. For Xerorthents part, see Xerorthents, shallow.										
Salinas:										
SaA	0–5	0.6–2.0	0.16–0.20	6.6–7.3	<2	Low	High	Low	0.43	5
	5–75	0.2–0.6	0.16–0.20	6.6–8.4	<2	Low	High	Low	0.43	
SbA, SbC	0–5	0.2–0.6	0.18–0.21	6.6–7.3	<2	Moderate	High	Low	0.37	5
	5–75	0.2–0.6	0.16–0.20	6.6–8.4	<2	Low	High	Low	0.43	
San Andreas: ScE, ScG	0–22	2.0–6.0	0.11–0.17	6.1–7.3	<2	Low	Moderate	Moderate	0.15	2
	22									
San Benito: SdF, SdG	0–55	0.2–0.6	0.17–0.21	6.6–8.4	<2	Moderate	High	Low	0.37	3
	55									
San Timoteo: SeG	0–24	2.0–6.0	0.09–0.15	7.9–8.4	<2	Low	High	Low	0.28	2
	24									
*Santa Lucia: SfD, SfE, SfF, Sg	0–24	0.6–2.0	0.10–0.14	5.1–6.5	<2	Low	High	High	0.15	2
For Reliz and Lopez parts of Sg, see those series.	24									
Santa Ynez: ShC, ShD, ShD2, ShE	0–18	0.6–2.0	0.09–0.16	5.6–7.3	<2	Low	Moderate	Low	0.43	1
	18–43	<0.06	0.01–0.03	5.6–7.8	<2	High	High	Low	0.37	
	43–61	0.06–0.2	0.01–0.03	5.6–8.4	<2	Moderate	High	Low	0.32	
Shedd:										
SmG3	0–30	0.6–2.0	0.16–0.19	7.9–8.4	<2	Moderate	High	Low	0.37	2
	30									
SnD, SnE, SnF2	0–30	0.2–0.6	0.18–0.21	7.9–8.4	<2	Moderate	High	Low	0.32	2
	30									
Shedd part of LcF2, LcG2	0–25	0.2–0.6	0.18–0.21	7.9–8.4	<2	Moderate	High	Low	0.32	2
	25									
Sheridan: SoD, SoE, SoG	0–39	2.0–6.0	0.10–0.14	5.6–7.3	<2	Low	Moderate	Moderate	0.24	2
	39									
*Snelling: SpD, SpE2	0–13	0.6–2.0	0.10–0.13	6.1–7.3	<2	Low	Low	Low	0.32	5
For Greenfield part, see Greenfield series.	13–46	0.2–0.6	0.15–0.17	6.1–7.8	<2	Moderate	Moderate	Low	0.20	
	46–58	0.6–2.0	0.08–0.12	6.1–8.4	<2	Low	High	Low	0.24	
Sorrento: SrA, SrC	0–25	0.2–0.6	0.18–0.21	6.6–8.4	<2	Moderate	High	Low	0.32	5
	25–60	0.2–0.6	0.16–0.21	7.9–8.4	<2	Low	High	Low	0.43	

TABLE 7.—*Estimated physical and chemical properties*—Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T
	In	*In/hr*	*In/in*	*pH*	*Mmhos/cm*					
*Sur: Ss, St. For Junipero part of Ss and Plaskett part of St, see those series.	0–24 24	2.0–6.0	0.05–0.10	5.6–7.3	<2	Low	Moderate	Moderate	0.10	1
Tangoir: TaC	0–62	6.0–20.0	0.05–0.08	4.5–7.3	<2	Low	High	High	0.15	5
Tujunga: TbB	0–60	6.0–20.0	0.05–0.11	6.1–7.8	<2	Low	Low	Low	0.17	5
*Vista:										
VaD, VaE, VaG	0–23 23	2.0–6.0	0.10–0.14	5.6–7.3	<2	Low	Moderate	Moderate	0.28	2
Vb. No estimates for Rock outcrop part.	0–23 23	2.0–6.0	0.07–0.13	5.6–7.3	<2	Low	Moderate	Moderate	0.28	2
Xererts-Xerolls complex: Xa.										
Xererts part	0–48	0.06–0.2	0.15–0.19	6.1–8.4	<2	High	High	Low	0.20	2
Xerolls part	0–48	0.06–0.2	0.17–0.21	6.1–8.4	<2	Moderate	High	Low	0.37	2
Xerorthents, sandy: Xb	0–60	2.0–6.0	0.05–0.10	5.1–7.3	<2	Low	Moderate	Moderate		
Xerorthents, loamy: Xc	0–60	0.2–0.6	0.10–0.15	6.1–8.4	<2	Moderate	High	Low		
Xerorthents, dissected: Xd. No estimates.	0–60									
Xerorthents, shallow. No estimates.	0–8 8									

how septic tank absorption fields and other underground installations will function. Also, a seasonal high water table affects ease of excavation.

Depth to bedrock is shown for all soils that are underlain by bedrock at a depth of 5 to 6 feet or less. A limited range in depth to bedrock is a part of the definition of many soil series. The depths shown are based on measurements made in many soil borings and on other observations made during the soil mapping. The kind of bedrock and its relative hardness as related to ease of excavation is also shown. Rippable bedrock can be excavated with a single-tooth ripping attachment on a 200-horsepower tractor, but hard bedrock generally requires blasting.

Cemented pans are hard subsurface layers that are strongly compacted (indurated). Such pans are difficult to excavate. Hardness of pans is defined in the same way as hardness of bedrock. Cemented pans are not shown in table 9 because they are important only in Gloria soils.

Sanitary facilities

Favorable soil properties and site features are needed for proper functioning of septic tank absorption fields, sewage lagoons, and sanitary landfills. The nature of the soil is important in selecting sites for these facilities and in identifying limiting soil properties and site features to be considered in design and installation. Also, those soil properties that deal with the ease of excavation or installation of these facilities will be of interest to contractors and local officials. Table 10 shows the degree and kind of limitations of each soil for these uses and for use as daily cover for landfills.

A rating of *slight* indicates that the soils are favorable for the specified use and limitations are minor and easily overcome; *moderate*, that soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and *severe*, that soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance are required.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into the natural soil. Only the soil horizons between a depth of 18 and 72 inches are evaluated for this use. The soil properties and site features considered are those that affect the absorption of the effluent and those that affect the construction of the system.

Properties and features that affect the absorption of the effluent are permeability, depth to seasonal high water table, depth to bedrock, and susceptibility to flooding. Stones, boulders, and a shallow depth to bedrock interfere with installation. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas. Also, soil erosion and soil slippage are hazards where absorption fields are installed in sloping soils.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the tile lines. In these soils the absorption field does not adequately filter the effluent, and as a result ground water supplies in the area may be contaminated.

Percolation tests are performed to determine the absorptive capacity of the soil and its suitability for septic tank absorption fields. These tests should be performed during the season when the water table is highest and the soil is at minimum absorptive capacity.

In many of the soils that have moderate or severe limitations for septic tank absorption fields, it is possible to install special systems that lower the seasonal water table or to increase the size of the absorption field so that satisfactory performance is achieved.

Sewage lagoons are shallow ponds constructed to hold sewage while bacteria decompose the solid and liquid wastes. Lagoons have a nearly level flow area surrounded by cut slopes or embankments of compacted, nearly impervious soil material. They generally are designed so that depth of the sewage is 2 to 5 feet. Impervious soil for the lagoon floor and sides must be at least 4 feet thick to minimize seepage and contamination of local ground water. Soils that are very high in organic-matter content and those that have stones and boulders are undesirable. Unless the soil has very slow permeability, contamination of local ground water is a hazard in areas where the seasonal high water table is above the level of the lagoon floor. In soils that have a seasonal high water table, seepage of ground water into the lagoon can seriously reduce the capacity for liquid waste. Slope, depth to bedrock, and susceptibility to flooding also affect the location of sites for sewage lagoons or the cost of construction. Shear strength and permeability of compacted soils affect the performance of embankments.

Sanitary landfill is a method of disposing of solid waste, either in excavated trenches or on the surface of the soil. The waste is spread in layers, compacted, and covered with thin layers of soil. Landfill areas are subject to heavy vehicular traffic. Ease of excavation, risk of polluting ground water, and trafficability affect the suitability of a soil for this purpose. The best soils have a loamy or silty texture, have moderate or slow permeability, are deep to bedrock and a seasonal water table, are free of large stones and boulders, and are not subject to flooding. In areas where the seasonal water table is high, water seeps into the trenches and causes problems in excavating and filling them. Also, seepage into the refuse increases the risk of pollution of ground water. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability that might allow noxious liquids to contaminate local ground water.

Unless otherwise stated, the ratings in table 10 apply only to soil properties and features within a depth of about 6 feet. If the trench is deeper, ratings of *slight* or *moderate* may not be valid. Site investigation is needed before a site is selected.

In the area-type sanitary landfill, refuse is placed on the surface of the soil in successive layers. The limitations caused by soil texture, depth to bedrock, and stone content do not apply to this type of landfill. Soil wetness, however, is a limitation if it hinders the operation of equipment.

Daily cover for sanitary landfills should be a soil that is easy to excavate and spread over the compacted fill during both wet and dry weather. Soils that are loamy or silty and free of stones or boulders are better than

TABLE 8.—*Engineering*

[Tests performed by the Bureau of Public Roads (BPR) according to standard procedures

Soil name and location	Parent material	Report No.	Depth	Horizon	Moisture-density data [1] Maximum dry density	Moisture-density data [1] Optimum moisture	Mechanical analysis [2] Percentage passing sieve— 3 in	2 in	1½ in	1 in
			Inches		*Pounds per cubic foot*	*Percent*				
Alviso: One mile S. of Moss Landing on Tembladero Slough; 0.4 mile W. on Potrero Road from Moss Landing Road; 600 feet N. (100 feet beyond dike).	Sedimentary alluvium.	70–1386	5–14	C1g	99	19	-------	-------	-------	-------
		70–1387	14–45	C2g	105	18	-------	-------	-------	-------
Antioch: 900 feet NW. of Hartnell Road on Alisal Road; 180 feet S. of farm road.	Sedimentary alluvium.	70–1388	4–15	A1	128	9	-------	-------	-------	-------
		70–1389	21–27	B21t	112	13	-------	-------	-------	-------
Arroyo Seco: 300 feet SW. of Greenfield-Arroyo Seco Road intersection.	Granite alluvium.	70–1397	18–29	A12	130	10	-------	100	97	94
		70–1398	42–60	IIC2	127	10	100	98	91	82
Chamise: In NE¼SE¼ sec. 34, T. 19 S., R. 7 E.	Alluvium derived from shale.	70–1392	4–18	A12	100	20	-------	-------	-------	100
		70–1393	29–40	B22t	96	21	100	98	95	90
		70–1394	40–60	C1	101	20	-------	100	99	97
Chualar: 0.45 mile SW. on Chualar Road from Old Stage Road; 83 feet NW. on dirt road; 20 feet NE. into field.	Granite alluvium.	65–1400	7–21	A12	135	8	-------	-------	-------	-------
		65–1401	21–30	B1t	134	9	-------	-------	-------	-------
		65–1402	44–55	B22t	130	9	-------	-------	-------	-------
Danville: Three miles N. of Gonzales; 2.2 miles NW. on Iverson Road from intersection of Johnson Canyon Road; 0.21 mile SW. on dirt road; 30 yards N. into field.	Granite alluvium.	70–1390	5–18	Ap2	124	9	-------	-------	-------	-------
		70–1391	18–38	B2t	118	11	-------	-------	-------	-------
Diablo: In SE¼NE¼ sec. 25, T. 20 S., R. 9 E.	Nonmarine shale.	65–1394	5–18	A12	96	23	-------	-------	-------	-------
		65–1395	53–68	C	76	35	-------	-------	-------	-------
Elkhorn: Four miles N. of Moss Landing; 2,600 feet W. and 3,000 feet N. on dirt road from intersection of Springfield Road and California Highway 1.	Marine terrace—underlain by weakly consolidated sediments.	70–1395	9–17	Ap2	135	8	-------	-------	-------	-------
		70–1396	26–46	B2t	131	10	-------	-------	-------	-------

See footnotes at end of table.

test data

of the American Association of State Highway and Transportation Officials (AASHTO)]

Mechanical analysis [2]—Continued											Liquid limit	Plasticity index	Classification	
Percentage passing sieve—Continued							Percentage smaller than—						AASHTO [3]	Unified
¾ in	⅜ in	No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 60 (0.25 mm)	No. 200 (0.074 mm)	0.05 mm	0.02 mm	0.005 mm	0.002 mm				
											Percent			
-------	-------	-------	100	99	99	99	98	61	46	34	56	27	A-7-6(32)	CH
100	95	81	81	80	80	80	80	57	50	41	68	40	A-7-6(35)	CH
-------	-------	100	98	86	78	59	54	30	17	11	16	[4] NP	A-4(0)	ML
-------	-------	-------	100	94	88	76	72	55	49	46	43	25	A-7-6(18)	CL
92	88	85	82	63	54	37	35	17	10	8	-------	NP	A-4(0)	SM
76	68	61	53	30	25	16	15	10	7	4	22	1	A-1-b(0)	SM
99	97	93	84	64	56	41	39	25	18	11	30	4	A-4(0)	SM
86	81	77	72	60	56	43	41	35	32	29	46	20	A-7-6(4)	SC
94	91	88	81	63	56	40	38	36	32	27	42	19	A-7-6(3)	SC
100	99	99	93	64	54	39	36	25	12	9	18	3	A-4(1)	SM
-------	-------	100	93	68	60	43	40	27	17	12	21	6	A-4(1)	SC-SM
-------	-------	100	90	57	49	36	34	25	17	13	29	13	A-6(1)	SC
-------	-------	100	91	64	62	50	48	36	29	24	33	14	A-6(4)	CL
-------	100	99	92	74	70	59	56	49	37	30	43	21	A-7-6(10)	CL
-------	-------	100	98	97	96	93	91	73	58	46	65	35	A-7-5(28)	CH
-------	-------	-------	-------	-------	100	95	93	28	14	9	73	24	A-7-5(33)	MH
-------	-------	-------	100	88	74	39	37	26	17	12	-------	NP	A-4(0)	SM
-------	-------	-------	100	88	73	35	34	25	18	15	-------	NP	A-2-4(0)	SM

TABLE 8.—*Engineering*

Soil name and location	Parent material	Report No.	Depth	Horizon	Moisture-density data[1]		Mechanical analysis[2]			
					Maximum dry density	Optimum moisture	Percentage passing sieve—			
							3 in	2 in	1½ in	1 in
			Inches		*Pounds per cubic foot*	*Percent*				
Linne: One mile NE. from main building on Topo Ranch; 3,000 feet NE. of reservoir; 70 feet uphill from dirt road.	Soft calcareous sandstone and shale.	65–1390	4–16	A12	107	18	------	------	------	------
Lockwood: 100 feet SW. and 50 feet NW. from corner of Teague and Central Avenues. North of King City.	Diatomaceous shale alluvium.	65–1388	16–26	A13	92	26	------	------	------	------
		65–1389	40–57	B12	84	32	100	89	85	81
Los Osos: In NE¼SW¼ sec. 6, T. 22 S., R. 15 E.	Soft sandstone.	70–1402	0–11	A1	119	12	------	------	------	------
		70–1403	11–23	B22t	115	13	------	------	------	------
		70–1404	31–46	C	115	14	------	------	------	------
Narlon: Del Monte Forest 525 feet N. from junction of Ronda Road and Viscaino Road; 100 feet E. of Viscaino.	Soft marine sediments.	70–1407	7–13	A22	136	7	------	------	------	------
		70–1408	23–37	B22t	108	16	------	------	------	------
		70–1409	53–61	C	123	11	------	------	------	------
Oceano: 1.5 miles N. of Marina on California Highway 1; 2,500 feet E. and SE. of south junction of Old California Highway 1 and California Highway 1.	Aeolian sands on stabilized dunes.	70–1405	3–12	A12	126	7	------	------	------	------
		70–1406	26–62	B2	141	7	------	------	------	------
Parkfield: In N. cor., SW¼ NE¼ sec. 31, T. 22 S., R. 15 E.	Metasedimentary alluvium.	70–1410	14–24	B2t	122	12	------	------	------	100
Placentia: 0.72 mile NW. on Iverson Road from Johnson Canyon Road on Widemann Ranch; 0.47 mile NE. to reservoir; 300 feet from base of dam.	Granitic alluvium.	65–1403	0–5	Ap1	128	9	------	------	------	------
		65–1404	20–29	B22t	110	6	------	------	------	------
Reliz: In E¼ cor. NE¼ SE¼NE¼SW¼ sec. 28, T. 22 S., R. 9 E.	Hard Monterey shale.	70–1411	4–17	A12	97	21	100	95	86	77

See footnotes at end of table.

test data—Continued

Mechanical analysis [2]—Continued											Liquid limit	Plasticity index	Classification	
Percentage passing sieve—Continued							Percentage smaller than—						AASHTO [3]	Unified
¾ in	⅜ in	No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 60 (0.25 mm)	No. 200 (0.074 mm)	0.05 mm	0.02 mm	0.005 mm	0.002 mm	*Percent*			
-------	-------	-------	100	98	96	88	84	55	34	23	42	19	A-7-6(18)	CL
100	98	94	93	73	74	67	63	30	17	10	32	6	A-4(4)	ML
78	64	52	45	36	33	29	27	16	10	8	40	12	A-2-6(0)	GM
100	98	97	91	81	74	43	38	26	19	15	26	7	A-4(0)	SC-SM
-------	100	99	96	84	80	50	45	38	31	27	37	19	A-6(7)	CL
100	99	97	90	78	66	42	38	31	24	19	35	16	A-6(4)	SC
-------	-------	-------	100	73	56	30	27	19	9	5	-------	NP	A-2-4(0)	SM
-------	-------	-------	100	82	75	64	63	58	52	50	52	30	A-7-6(18)	CH
-------	-------	-------	100	73	60	41	39	33	28	24	33	16	A-6(3)	SC
-------	-------	-------	100	51	30	17	16	13	9	6	-------	NP	A-2-4(0)	SM
-------	-------	-------	100	50	31	18	18	14	11	8	-------	NP	A-1-6(0)	SM
99	95	93	88	76	69	54	51	37	28	23	33	17	A-6(6)	CL
-------	-------	100	96	70	62	47	45	29	15	9	19	3	A-4(1)	SM
-------	-------	100	98	79	72	61	59	53	43	38	58	33	A-7-6(19)	CH
72	67	63	55	47	43	39	38	33	26	22	35	7	A-4(1)	GM

TABLE 8.—*Engineering*

Soil name and location	Parent material	Report No.	Depth	Horizon	Moisture-density data[1]		Mechanical analysis[2]			
					Maximum dry density	Optimum moisture	Percentage passing sieve—			
							3 in	2 in	1½ in	1 in
			Inches		*Pounds per cubic foot*	*Percent*				
Salinas: 1.3 miles S. of Chualar Underpass on U.S. Highway 101; 1,100 feet SW. on paved road; 600 feet SE. on farm road.	Sedimentary alluvium.	65–1396	5–13	Ap2	114	14	------	------	------	------
		65–1397	49–75	C3	109	17	------	------	------	------
Santa Lucia: In NE¼SE¼ sec. 22, T. 19 S., R. 9 E.	Hard Monterey shale.	70–1414	6–16	A12	88	26	------	------	------	100
Shedd: In SE¼NW¼ sec. 11, T. 20 S., R. 9 E.	Soft calcareous sandstone and shale.	65–1392	12–23	A13	90	30	------	------	------	------

[1] Based on AASHTO designation T 99.
[2] Mechanical analyses according to AASHTO designation T 88. Results by this procedure frequently may differ somewhat from results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHTO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is ana-

other soils. Clayey soils may be sticky and difficult to spread; sandy soils may be subject to soil blowing.

In addition to these features, the soil selected for final cover of landfills should be suitable for growing plants. In comparison with other horizons, the A horizon in most soils has the best workability, more organic matter, and the best potential for growing plants. Thus, for either the area- or trench-type landfill, stockpiling material from the A horizon for use as the surface layer of the final cover is desirable.

Where it is necessary to bring in soil material for daily or final cover, thickness of suitable soil material available and depth to a seasonal high water table in soils surrounding the sites should be evaluated. Other factors to be evaluated are those that affect reclamation of the borrow areas, such as slope, erodibility, and potential for plant growth.

Building site development

The degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets are indicated in table 11. A *slight* limitation indicates that soil properties are favorable for the specified use; any limitation is minor and easily overcome. A *moderate* limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A *severe* limitation indicates one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated *severe,* such costly measures may not be feasible.

Shallow excavations are used for pipelines, sewerlines, telephone and power transmission lines, basements, open ditches, and cemeteries. Such digging or trenching is influenced by the soil wetness of a seasonal high water table, the texture and consistence of soils, the tendency of soils to cave in or slough, and the presence of very firm, dense soil layers, bedrock, or large stones. In addition, excavations are affected by slope and the probability of flooding. Ratings do not apply to soil horizons below a depth of 6 feet unless otherwise noted.

In the soil series descriptions, the consistence of each soil horizon is defined, and the presence of very firm or extremely firm horizons, generally difficult to excavate, indicated.

Dwellings and small commercial buildings referred to in table 11 are built on undisturbed soil and have foundation loads of a dwelling not more than three stories high. Separate ratings are made for small commercial buildings without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking or subsidence of the structure from settling or shear failure of the

test data—Continued

Mechanical analysis [2]—Continued											Liquid limit	Plasticity index	Classification	
Percentage passing sieve—Continued							Percentage smaller than—						AASHTO [3]	Unified
¾ in	⅜ in	No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 60 (0.25 mm)	No. 200 (0.074 mm)	0.05 mm	0.02 mm	0.005 mm	0.002 mm				
											Percent			
------	------	------	100	98	96	68	61	45	29	22	33	14	A-6(8)	CL
------	------	------	------	100	98	65	45	18	6	5	------	NP	A-4(0)	ML
98	88	82	67	57	54	42	36	25	16	12	36	4	A-4(0)	SM
------	------	100	98	84	79	69	66	47	24	12	52	15	A-7-5(12)	MH

lyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for use in naming textural classes for soil.

[3] Based on AASHTO designation M 145-49.

[4] NP means nonplastic.

foundation does not occur. These ratings were determined from estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in-place density, potential frost action, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gardens. Depth to bedrock, slope, and large stones in or on the soil are also important considerations in the choice of sites for these structures and were considered in determining the ratings. Susceptibility to flooding is a serious limitation.

Roads and streets referred to in table 11 have an all-weather surface that can carry light to medium traffic all year. They consist of subgrade of the underlying soil material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. The roads are graded with soil material at hand, and most cuts and fills are less than 6 feet deep.

The load-supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The AASHTO and Unified classifications of the soil and soil texture, density, shrink-swell potential, and potential frost action are indicators of the traffic-supporting capacity used in making the ratings. Soil wetness, flooding, slope, depth to hard rock or very compact layers, and content of large stones, all of which affect stability and ease of excavations, were also considered.

Construction materials

The suitability of each soil as a source of roadfill, sand, gravel, and topsoil is indicated in table 12 by ratings of *good*, *fair*, or *poor*. The texture, thickness, and organic-matter content of each soil horizon are important factors in rating soils for use as construction materials. Each soil is evaluated to the depth observed and described as the survey is made, generally about 6 feet.

Roadfill is soil material used in embankments for roads. The ratings reflect the ease of excavating and working the material and the expected performance of the material after it has been compacted and adequately drained. The performance of soil after it is stabilized with lime or cement is not considered in the ratings, but information about soil properties that determine such performance is given in the descriptions of soil series.

The ratings apply to the soil profile between the A horizon and a depth of 5 to 6 feet. It is assumed that soil horizons will be mixed during excavation and spreading. Many soils have horizons of contrasting suitability within the profile. The estimated engineering properties in table 6 provide more specific infor-

TABLE 9.—*Soil and water features*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil which may have different properties and limitations. For this reason it is necessary to follow carefully the instructions for referring to other series that appear in the first column. Absence of an entry indicates the feature is not a concern. See the definitions of "flooding" and "water table" in the Glossary for explanations of such terms as "rare," "brief," and "perched." The symbol > means greater than]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness
					Ft			*In*	
*Alo: AaC, AaD, AaE, AaF, Ab For Millsholm part of Ab, see Millsholm series.	D	None			>6.0			30–40	Rippable
Alviso:									
Ac	D	Common	Very brief	Jan-Dec	0.0–1.0	Apparent	Jan-Dec	>60	
Ad	D	Rare			1.0–2.0	Apparent	Jan-Dec	>60	
Antioch: AeA, AeC, AeD	D	None			>6.0			>60	
Aquic Xerofluvents: Af	C	Common	Brief	Nov-Mar	3.0–5.0	Apparent	Nov-Jun	>60	
Arbuckle: AgC, AgD	B	None			>6.0			>60	
*Arnold: AkD, AkF, Am, Ar For San Andreas part of Am and Santa Ynez part of Ar, see the San Andreas and Santa Ynez series.	B	None			>6.0			40–60	Rippable
Arroyo Seco: AsA, AsB, AsC, AvA, AvB	B	None			>6.0			>60	
Ayar: AyD, AyE, AyF	D	None			>6.0			40–60	Rippable
Badland: Ba. No features.									
Baywood: BbC	A	None			>6.0			>60	
Chamise: CaD, CaE, CaF	B	None			>6.0			>60	
Chualar: CbA, CbB, CbC	B	None			>6.0			>60	
*Cieneba: CcG, Cd, Ce For Sur part of Ce, see Sur series. No features for Rock outcrop.	C	None			>6.0			7–18	Rippable
Clear Lake:									
Cf	D	Common	Brief	Dec-Feb	1.0–3.0	Apparent	Oct-Mar	>60	
Cg	D	Common	Brief	Nov-Mar	3.0–5.0	Apparent	Jan-Dec	>60	
*Climara: ChE, ChF, Ck For Montara part of Ck, see Montara series.	D	None			>6.0			30–40	Hard
Coastal beaches: Cm. No features.									
Cropley: CnA, CnC	D	None			>6.0			>60	

Danville: DaA, DaC	C	None			>6.0			>60	
Diablo: DbD, DbE, DbF	D	None			>6.0			40–60	Rippable
Dibble: DcC, DdB, DdE, DdF	C	None			>6.0			24–40	Rippable
Docas: DeA, DeC	B	None			>6.0			>60	
Dune land: Df. No features.									
Elder:									
EaA	B	None			>6.0			>60	
EbC	B	None			>6.0			40–72	
EcA	A	None			>6.0			>60	
Elkhorn: EdB, EdC, EdD	B	None			>6.0			>60	
Elkhorn variant: EeD, EeE	C	None			>6.0			24–40	Rippable
Fluvents, stony: Fa	A	Common	Brief to very long.	Oct-Jun	>6.0			>60	
*Gamboa: Ga For Sur part and Junipero part see those series.	A	None			>6.0			40–60	Hard
*Garey: GbC, GbE, GbF2, Gc For Oceano part of Gc, see Oceano series.	C	None			>6.0			>60	
*Gaviota: GdE, GdF, GeE, GeG For San Andreas part of GeE and GeG, see San Andreas series.	D	None			>6.0			10–20	Hard
Gazos: GfE, GfF	C	None			>6.0			24–40	Hard
Gilroy: GgE, GgG2	C	None			>6.0			20–36	Hard
Gloria:[1] GhC, GhD, GhF	D	None			>6.0			>60	
Gorgonio: GkB	A	None			>6.0			>60	
Greenfield: GmB, GmC, GmD	B	None			>6.0			>60	
Haire: HaE	C	None			>6.0			40–60	
Hanford: HbB	B	None			>6.0			>60	
Henneke: HcF	D	None			>6.0			13–17	Hard
*Junipero: JaF, JbG, Jc For Sur part of Jc, see Sur series.	B	None			>6.0			20–40	Rippable
*Linne:									
LaD, LbD	C	None			>6.0			30–40	Rippable
LaE, LaF, LbE, LcE LcF For Diablo part of LbD, LbE, and LcF, see Diablo series. For Shedd part of LcE and LcF, see Shedd series.	C	None			>6.0			24–40	Rippable

See footnote at end of table.

TABLE 9.—*Soil and water features*—Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness
					Ft			*In*	
Linne—Con. LcF2, LcG2 For Shedd part, see Shedd series. For Diablo part of LcG2, see Diablo series.	C	None			>6.0			20–40	Rippable
Lockwood: LdA, LdC, LeA, LeC, LeD	B	None			>6.0			>60	
LgA	C	None			2.0–4.0	Perched	Nov-Apr	>60	
Lopez: LhE	D	None			>6.0			10–20	Hard
Los Gatos: LkF, LkG	C	None			>6.0			20–40	Hard
*Los Osos: LmD, LmE, LmF, LmG, Ln For Millsholm part of Lm, see Millsholm series.	C	None			>6.0			24–40	Hard
*McCoy: MaE, MbE For Gilroy part of MbE, see Gilroy series.	C	None			>6.0			30–40	Rippable
MaF, MaG For Gilroy part of MbG, see Gilroy series.	C	None			>6.0			20–40	Rippable
McCoy variant: McG	C	None			>6.0			40–60	Hard
*McMullin: Md For Plaskett part, see Plasket series.	D	None			>6.0			10–20	Hard
Metz: Me, Mf, Mg	A	None			>6.0			>60	
*Millsholm: MhG, Mk, Mm For Alo part of Mk and Gazos part of Mm, see Alo and Gazo series.	D	None			>6.0			10–20	Hard
Mocho: MnA, MoA, MoC	B	None			>6.0			>60	
Montara: Mp No features for Rock outcrop part.	D	None			>6.0			10–20	Hard
*Nacimiento: NaD, NaE, NaF, NaG, NbF, NbG For Los Osos and San Benito parts of NbF and NbG, see Los Osos and San Benito series.	C	None			>6.0			24–40	Rippable
Narlon: NcC, NcE	D	None			0.5–1.5	Perched	Nov-Apr	40–60	
Oceano: OaD	A	None			>6.0			>60	
Pacheco: Pa	C	None to rare			3.0–5.0	Apparent	Dec-May	>60	

Pb	C	Common	Brief	Nov-Mar	>6.0			>60	
Parkfield:									
PcC	C	None			>6.0			24–36	Rippable
PcE	C	None			>6.0			20–30	Rippable
Pfeiffer:									
PdC, Pe No features for Rock outcrop part of Pe.	B	None			>6.0			40–60	Rippable
PdD	B	None			>6.0			40–48	Rippable
Pico: Pf	B	None			>6.0			>60	
Pinnacles: PgE, PhG2	C	None			>6.0			25–40	Rippable
Pinnacles variant: PkE, PkF	D	None			>6.0			>60	
Pits and dumps: Pm. No features.									
*Placentia: PnA, PnC, PnD, PnE, PoE For Arbuckle part of PoE, see Arbuckle series.	D	None			>6.0			>60	
*Plaskett: Pp For Reliz part, see Reliz series.	D	None			>6.0			10–20	Hard
Psamments, and Fluvents, flooded: Pr, Ps.									
Psamments part	A	Common	Brief to very long.	Oct-Jun	2.0–6.0	Apparent	Oct-Jun	>60	
Fluvents part	A	Common	Brief to very long.	Oct-Jun	2.0–6.0	Apparent	Oct-Jun	>60	
Reliz series	D	None			>6.0			10–20	Hard
Rincon: RaA, RaC, RaD, RaE	C	None			>6.0			>60	
Rindge: Rb	D	Common	Very long	Nov-Jun	0.0–3.0	Apparent	Jan-Dec	>60	
*Rock outcrop: Rc. No features for Rock outcrop part. For Xerorthents part, see Xerorthents, shallow.									
Salinas: SaA, SbA, SbC	C	None			>6.0			>60	
San Andreas: ScE, ScG	B	None			>6.0			20–40	Rippable
San Benito: SdF, SdG	B	None			>6.0			40–60	Rippable
San Timoteo: SeG	C	None			>6.0			20–30	Rippable
*Santa Lucia: SfD, SfE, SfF, Sg For Reliz and Lopez parts of Sg, see Reliz and Lopez series.	C	None			>6.0			20–40	Hard
Santa Ynez: ShC, ShD, ShD2, ShE	D	None			>6.0			>60	
Shedd:									
SnD	C	None			>6.0			30–40	Rippable
SmG3, SnF2, SnE	C	None			>6.0			20–30	Rippable

TABLE 9.—*Soil and water features*—Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness
					Ft			*In*	
Shedd—Con.									
Shedd part of LcE, LcF, LcF2 and LcG2.	C	None	---	---	>6.0	---	---	24–36	Rippable
Sheridan: SoD, SoE, SoG	B	None	---	---	>6.0	---	---	20–40	Rippable
*Snelling: SpD, SpE2 For Greenfield part, see Greenfield series.	B	None	---	---	>6.0	---	---	>60	---
Sorrento: SrA, SrC	B	None	---	---	>6.0	---	---	>60	---
*Sur: Ss, St For Junipero part of Ss and Plaskett part of St, see Junipero and Plaskett series.	B	None	---	---	>6.0	---	---	20–40	Hard
Tangair: TaC	C	None	---	---	2.0–5.0	Perched	Nov-Apr	>60	---
Tujunga: TbB	A	None	---	---	>6.0	---	---	>60	---
Vista: VaD, VaE, VaG, Vb No features for Rock outcrop part of Vb.	C	None	---	---	>6.0	---	---	20–36	Rippable
Xererts-Xerolls complex: Xa.									
Xererts part	D	None	---	---	>6.0	---	---	>40	Rippable
Xerolls part	C	None	---	---	>6.0	---	---	>40	Rippable
Xerorthents, sandy: Xb	A	None	---	---	>6.0	---	---	>60	---
Xerorthents, loamy: Xc	B	None	---	---	>6.0	---	---	>60	---
Xerorthents, dissected: Xd	---	None	---	---	>6.0	---	---	>60	---
Xerorthents, shallow	D	None	---	---	>6.0	---	---	1–10	Hard

[1] Gloria soils have a hard cemented pan at a depth of 20 to 40 inches.

TABLE 10.—*Soil ratings for sanitary facilities*

["Shrink-swell," "seepage," and other terms that describe restrictive soil features are defined in the Glossary. An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil which may have different properties and limitations. For this reason it is necessary to follow fully the instructions for referring to other series that appear in the first column]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
*Alo:					
AaC	Severe: depth to rock, percs slowly.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Slight	Poor: too clayey, hard to pack.
AaD	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
AaE	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: slope	Poor: too clayey, hard to pack, slope.
AaF, Ab. For Millsholm part of Ab, see Millsholm series.	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey, slope.	Severe: slope	Poor: too clayey, hard to pack, slope.
Alviso:					
Ac	Severe: wetness, floods, percs slowly.	Severe: wetness, floods.	Severe: wetness, floods, too clayey.	Severe: wetness, floods.	Poor: too clayey, wetness.
Ad	Severe: wetness, percs slowly.	Severe: wetness, floods.	Severe: wetness, too clayey.	Severe: wetness.	Poor: wetness, too clayey.
Antioch:					
AeA	Severe: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Fair: thin layer, area reclaim.
AeC	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: thin layer, area reclaim.
AeD	Severe: percs slowly.	Severe: slope	Moderate: too clayey.	Moderate: slope.	Fair: thin layer, slope, area reclaim.
Aquic Xerofluvents: Af	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: floods	----------------
Arbuckle:					
AgC	Severe: percs slowly.	Moderate: slope, small stones.	Moderate: too clayey.	Slight	Fair: too clayey, small stones.
AgD	Severe: percs slowly.	Severe: slope	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, small stones, slope.
Arbuckle part of PoE	Severe: slope, percs slowly.	Severe: slope	Moderate: too clayey, slope.	Severe: slope	Fair: too clayey, small stones.
*Arnold:					
AkD	Moderate: slope, depth to rock.	Severe: slope, seepage.	Severe: seepage, too sandy, depth to rock.	Severe: seepage.	Poor: too sandy.
AkF, Am. For San Andreas part of Am, see SeG in San Andreas series.	Severe: slope	Severe: slope, seepage.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope.	Poor: too sandy, slope.

TABLE 10.—*Soil ratings for sanitary facilities*—Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Arnold—Con.					
Ar. For Santa Ynez part, see ShE in Santa Ynez series.	Severe: slope	Severe: slope, seepage.	Severe: seepage, too sandy, depth to rock.	Severe: seepage, slope.	Poor: too sandy, slope.
Arroyo Seco:					
AsA, AsB, AvA, AvB	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: small stones.
AsC	Slight	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Fair: small stones.
Ayar:					
AyD	Severe: percs slowly.	Severe: slope	Severe: too clayey, depth to rock.	Moderate: slope.	Poor: too clayey.
AyE	Severe: slope, percs slowly.	Severe: slope	Severe: too clayey, depth to rock.	Severe: slope	Poor: slope, too clayey.
AyF	Severe: slope, percs slowly.	Severe: slope	Severe: slope, too clayey, depth to rock.	Severe: slope	Poor: slope, too clayey.
Badland: Ba. No ratings.					
Baywood: BbC	Moderate: slope.	Severe: slope, seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.
Chamise:					
CaD	Severe: percs slowly.	Severe: slope	Moderate: too clayey.	Moderate: slope.	Poor: small stones.
CaE	Severe: slope, percs slowly.	Severe: slope	Moderate: slope, too clayey.	Severe: slope	Poor: slope, small stones.
CaF	Severe: slope, percs slowly.	Severe: slope	Severe: slope	Severe: slope	Poor: slope, small stones.
Chualar: CbA, CbB, CbC	Severe: percs slowly.	Severe: seepage	Severe: seepage.	Severe: seepage.	Good.
*Cieneba:					
CcG, Cd, Ce. No ratings for Rock outcrop part of Cd and Ce. For Sur part of Ce, see Sur series.	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage.	Poor: slope, thin layer.
Clear Lake:					
Cf	Severe: wetness, floods, percs slowly.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: floods, wetness.	Poor: wetness, too clayey.
Cg	Severe: wetness, floods, percs slowly.	Severe: floods	Severe: floods, wetness, seepage.	Severe: floods, wetness.	Poor: too clayey, wetness.
*Climara:					
ChE	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, too clayey.	Severe: slope	Poor: slope, too clayey, area reclaim.
ChF, Ck. For Montara part of Ck, see Montara series.	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, too clayey.	Severe: slope	Poor: slope, too clayey, area reclaim.

TABLE 10.—*Soil ratings for sanitary facilities*—Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Coastal beaches: Cm. No ratings.					
Cropley:					
CnA	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey.
CnC	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
Danville:					
DaA	Severe: percs slowly.	Slight	Moderate: too clayey.	Slight	Fair: thin layer, too clayey.
DaC	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: thin layer, too clayey.
Diablo:					
DbD	Severe: percs slowly.	Severe: slope	Severe: depth to rock, too clayey.	Moderate: slope.	Poor: too clayey.
DbE	Severe: slope, percs slowly.	Severe: slope	Severe: depth to rock, too clayey.	Severe: slope	Poor: slope, too clayey.
DbF	Severe: slope, percs slowly.	Severe: slope	Severe: slope, depth to rock, too clayey.	Severe: slope	Poor: slope, too clayey.
Dibble:					
DcC	Severe: percs slowly, depth to rock.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Slight	Poor: too clayey.
DdB	Severe: percs slowly, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, too clayey.	Moderate: slope.	Poor: too clayey.
DdE	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, too clayey.	Severe: slope	Poor: slope, too clayey.
DdF	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, too clayey.	Severe: slope	Poor: slope, too clayey.
Docas:					
DeA	Severe: percs slowly.	Slight	Moderate: too clayey.	Slight	Fair: too clayey.
DeC	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Dune land: Df. No ratings.					
Elder:					
EaA	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Good.
EbC	Moderate: percs slowly.	Moderate: slope, seepage.	Slight	Slight	Good.
EcA	Moderate: percs slowly.	Severe: seepage.	Severe: seepage, small stones, large stones.	Severe: seepage.	Good.

TABLE 10.—*Soil ratings for sanitary facilities*—Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Elkhorn:					
EdB, EdC	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Good.
EdD	Severe: percs slowly.	Severe: slope	Slight	Moderate: slope.	Fair: slope.
Elkhorn variant:					
EeD	Severe: percs slowly, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: slope.	Fair: slope, thin layer.
EeE	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope	Poor: slope.
Fluvents, stony: Fa	Severe: large stones, floods.	Severe: large stones, floods, seepage.	Severe: large stones, floods, seepage.	Severe: floods, seepage.	Poor: large stones, seepage.
*Gamboa: Ga. For Sur part, see Sur series. For Junipero part, see Junipero series.	Severe: slope, depth to rock.	Severe: slope, small stones, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope, small stones.
*Garey:					
GbC	Severe: percs slowly.	Moderate: slope.	Severe: seepage.	Slight	Good.
GbE, GbF2, Gc. For Oceano part of Gc, see Oceano series.	Severe: slope, percs slowly.	Severe: slope	Severe: seepage, slope.	Severe: slope	Poor: slope.
*Gaviota:					
GdE, GeE. For San Andreas part of GeE, see ScE in San Andreas series.	Severe: slope, depth to rock.	Severe: slope, seepage.	Severe: depth to rock, seepage.	Severe: slope, seepage.	Poor: slope, thin layer.
GdF, GeG. For San Andreas part of GeG, see ScE in San Andreas series.	Severe: slope, depth to rock.	Severe: slope, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage.	Poor: slope, thin layer.
Gazos:					
GfE	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope	Poor: slope.
GfF	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope	Poor: slope.
Gilroy:					
GgE, GgG2	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope	Poor: slope.
Gilroy part of MbE	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope	Poor: slope.
Gloria:					
GhC	Severe: cemented pan.	Severe: cemented pan.	Severe: cemented pan.	Slight	Poor: thin layer.
GhD	Severe: cemented pan.	Severe: slope, cemented pan.	Severe: cemented pan.	Moderate: slope.	Poor: thin layer.
GhF	Severe: cemented pan, slope.	Severe: slope, cemented pan.	Severe: slope	Severe: slope	Poor: slope, thin layer.
Gorgonio: GkB	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too sandy.

TABLE 10.—*Soil ratings for sanitary facilities*—Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Greenfield:					
GmB	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
GmC	Slight	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Good.
GmD	Moderate: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Fair: slope.
Greenfield part of SpE2	Severe: slope	Severe: slope, seepage.	Severe: seepage.	Severe: seepage, slope.	Poor: slope.
Haire: HaE	Severe: slope, percs slowly.	Severe: slope	Moderate: slope, too clayey.	Severe: slope	Poor: slope.
Hanford: HbB	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: small stones.
Henneke: HcF	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope	Poor: slope, thin layer, large stones.
*Junipero: JaF, JbG, Jc For Sur part of Jc, see Sur series.	Severe: slope, depth to rock.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage.	Poor: slope.
*Linne:					
LaD, LbD For Diablo part of LbD, see DbD in Diablo series.	Severe: depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: slope.	Fair: slope, thin layer, too clayey.
LaE	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope	Poor: slope.
LaF	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope	Poor: slope.
LbE, LcE For Diablo part of LbE, see DbE in Diablo series. For Shedd part of LcE, see SmE in Shedd series.	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope	Poor: slope.
LcF, LcG2, LcF2 For Shedd part, see SmF2 in Shedd series. For Diablo part of LcF and LcG2, see DbF in Diablo series.	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope	Poor: slope.
Lockwood:					
LdA	Severe: percs slowly.	Slight	Slight	Slight	Fair: too clayey.
LdC	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Fair: too clayey.
LeA	Severe: percs slowly.	Slight	Slight	Slight	Fair: small stones.
LeC	Severe: percs slowly.	Moderate: slope.	Slight	Slight	Fair: small stones.

TABLE 10.—*Soil ratings for sanitary facilities*—Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Lockwood—Con.					
LeD	Severe: percs slowly.	Severe: slope	Slight	Moderate: slope.	Fair: slope, small stones.
LgA	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: small stones.
Lopez:					
LhE	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope	Poor: slope, small stones, thin layer.
Lopez part of Sg	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope	Poor: slope, small stones, thin layer.
Los Gatos: LkF, LkG	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope	Poor: slope.
*Los Osos:					
LmD	Severe: depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock, too clayey.	Moderate: slope.	Fair: slope, thin layer, too clayey.
LmE	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock, too clayey.	Severe: slope	Poor: slope.
LmF, LmG, Ln. For Millsholm part of Ln, see Mk in Millsholm series.	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: slope, depth to rock, too clayey.	Severe: slope	Poor: slope.
*McCoy:					
MaE, MbE. For Gilroy part of MbE, see Gilroy series.	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope	Poor: slope.
MaF, MaG, MbG. For Gilroy part of MbG, see Gilroy series.	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope	Poor: slope.
McCoy variant: McG	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope	Poor: slope, large stones, small stones.
*McMullin: Md. For Plaskett part, see Plaskett series.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope	Poor: slope, thin layer.
Metz: Me, Mf, Mg	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too sandy.
*Millsholm: MhG, Mk, Mm. For Alo part of Mk, see AaE in Alo series. For Gazos part of Mm, see GfF in Gazos series.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope	Poor: slope, thin layer.
Mocho:					
MnA	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Good.
MoA	Severe: percs slowly.	Slight	Moderate: too clayey.	Slight	Fair: too clayey.
MoC	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.

TABLE 10.—*Soil ratings for sanitary facilities*—Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Montara: Mp. No ratings for Rock outcrop part.	Severe: slope, depth to rock, percs slowly.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: slope	Poor: slope, thin layer, area reclaim.
*Nacimiento:					
NaD	Severe: depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: slope.	Fair: slope, thin layer, too clayey.
NaE	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope	Poor: slope.
NaF, NaG, NbF, NbG. For Los Osos part of NbF and NbG, see LmF, LmG in Los Osos series. For San Benito part, see San Benito series.	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope	Poor: slope.
Narlon:					
NcC	Severe: percs slowly, wetness.	Severe: seepage, wetness.	Severe: too clayey, wetness.	Severe: wetness.	Poor: wetness.
NcE	Severe: slope, percs slowly, wetness.	Severe: slope, seepage, wetness.	Severe: too clayey, wetness.	Severe: wetness, slope.	Poor: wetness, slope.
Oceano:					
OaD	Moderate: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Fair: slope, too sandy.
Oceano part of Gc	Severe: slope	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope.
Pacheco:					
Pa	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
Pb	Severe: percs slowly, floods.	Severe: floods	Severe: floods	Severe: floods	Fair: too clayey.
Parkfield:					
PcC	Severe: percs slowly, depth to rock.	Severe: depth to rock.	Severe: too clayey.	Slight	Poor: too clayey, thin layer.
PcE	Severe: slope, percs slowly, depth to rock.	Severe: depth to rock, slope.	Severe: too clayey.	Severe: slope	Poor: slope, too clayey.
Pfeiffer:					
PdC	Moderate: depth to rock.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
PdD	Moderate: slope, depth to rock.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Fair: slope.
Pe. No ratings for Rock outcrop part.	Severe: slope	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope.
Pico: Pf	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
Pinnacles:					
PgE	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope	Poor: slope.

TABLE 10.—*Soil ratings for sanitary facilities*—Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Pinnacles—Con.					
PhG2	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope	Poor: slope, large stones.
Pinnacles variant:					
PkE	Severe: slope, percs slowly.	Severe: slope, seepage.	Moderate: slope.	Severe: slope	Poor: slope.
PkF	Severe: slope, percs slowly.	Severe: slope, seepage.	Severe: slope	Severe: slope	Poor: slope.
Pits and dumps: Pm. No ratings.					
*Placentia:					
PnA	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Fair: thin layer.
PnC	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: thin layer, area reclaim.
PnD	Severe: percs slowly.	Severe: slope	Severe: too clayey.	Moderate: slope.	Poor: thin layer, area reclaim.
PnE, PoE For Arbuckle part of PoE, see Arbuckle series.	Severe: slope, percs slowly.	Severe: slope	Severe: too clayey.	Severe: slope	Poor: slope, thin layer, area reclaim.
*Plaskett: Pp For Reliz part, see Reliz series.	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage.	Poor: slope, small stones, thin layer.
Psamments and Fluvents, flooded: Pr, Ps.					
Psamments part	Severe: floods, wetness.	Severe: floods, seepage, wetness.	Severe: floods, seepage, wetness.	Severe: floods, seepage, wetness.	Poor: too sandy, wetness.
Fluvents part	Severe: floods, wetness.	Severe: floods, seepage, wetness.	Severe: floods, seepage, wetness.	Severe: floods, seepage, wetness.	Poor: small stones, seepage.
Reliz	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope	Poor: slope, thin layer, small stones.
Rincon:					
RaA	Severe: percs slowly.	Slight	Moderate: too clayey.	Slight	Fair: too clayey.
RaC	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
RaD	Severe: percs slowly.	Severe: slope	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, slope.
RaE	Severe: percs slowly, slope.	Severe: slope	Moderate: too clayey, slope.	Severe: slope	Poor: slope.
Rindge: Rb	Severe: wetness, floods.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, excess humus.	Severe: wetness, floods, seepage.	Poor: wetness, excess humus.
*Rock outcrop: Rc. No ratings for Rock outcrop. For Xerorthents part, see Xerorthents, shallow.					

TABLE 10.—*Soil ratings for sanitary facilities*—Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Salinas:					
SaA	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Good.
SbA	Severe: percs slowly.	Slight	Moderate: too clayey.	Slight	Fair: too clayey.
SbC	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
San Andreas:					
ScE	Severe: slope, depth to rock.	Severe: slope, seepage, depth to rock.	Severe: seepage, depth to rock.	Severe: slope, seepage.	Poor: slope.
ScG	Severe: slope, depth to rock.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage.	Poor: slope.
San Benito: SdF, SdG	Severe: slope, percs slowly.	Severe: slope	Severe: slope, depth to rock.	Severe: slope	Poor: slope.
San Timoteo: SeG	Severe: slope, depth to rock.	Severe: slope, seepage.	Severe: slope, depth to rock.	Severe: slope, seepage.	Poor: slope.
*Santa Lucia:					
SfD	Severe: depth to rock.	Severe: slope, depth to rock, small stones.	Severe: depth to rock.	Moderate: slope.	Poor: small stones.
SfE	Severe: slope, depth to rock.	Severe: slope, depth to rock, small stones.	Severe: depth to rock.	Severe: slope	Poor: slope, small stones.
SfF, Sg For Reliz and Lopez parts of Sg, see Reliz and Lopez series.	Severe: slope, depth to rock.	Severe: slope, depth to rock, small stones.	Severe: slope, depth to rock.	Severe: slope	Poor: slope, small stones.
Santa Ynez:					
ShC	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Poor: thin layer, too clayey.
ShD, ShD2	Severe: percs slowly.	Severe: slope	Moderate: too clayey.	Moderate: slope.	Poor: thin layer, too clayey.
ShE	Severe: slope, percs slowly.	Severe: slope	Moderate: slope, too clayey.	Severe: slope	Poor: slope, thin layer, too clayey.
Shedd:					
SmG3	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope	Poor: slope.
SnD	Severe: percs slowly, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: slope.	Fair: slope, too clayey, thin layer.
SnE	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope	Poor: slope.
SnF2	Severe: slope, percs slowly, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope	Poor: slope.
Sheridan:					
SoD	Severe: depth to rock.	Severe: slope, depth to rock, seepage.	Severe: seepage, depth to rock.	Severe: seepage.	Fair: slope, thin layer.
SoE	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: seepage, depth to rock.	Severe: slope, seepage.	Poor: slope.

TABLE 10.—*Soil ratings for sanitary facilities*—Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Sheridan—Con.					
SoG	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage.	Poor: slope.
*Snelling:					
SpD For Greenfield part, see GmD in Greenfield series.	Severe: percs slowly.	Severe: slope	Slight	Moderate: slope.	Fair: slope.
SpE2 For Greenfield part, see Greenfield series.	Severe: slope, percs slowly.	Severe: slope	Moderate: slope.	Severe: slope	Poor: slope.
Sorrento:					
SrA	Severe: percs slowly.	Slight	Moderate: too clayey.	Slight	Fair: too clayey.
SrC	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
*Sur: Ss, St For Junipero part of Ss, see Junipero series. For Plaskett part of St, see Plaskett series.	Severe: slope, depth to rock, large stones.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage.	Poor: slope, large stones, small stones.
Tangair: TaC	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, too sandy, seepage.	Severe: seepage.	Poor: wetness, too sandy.
Tujunga: TbB	Slight	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.
*Vista:					
VaD	Severe: depth to rock.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage.	Fair: slope, thin layer.
VaE	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: slope, seepage.	Poor: slope.
VaG, Vb No ratings for Rock outcrop part of Vb.	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage.	Poor: slope.
Xererts-Xerolls complex: Xa.					
Xererts part	Severe: slope, percs slowly.	Severe: slope	Severe: slope, too clayey.	Severe: slope	Poor: slope, too clayey.
Xerolls part	Severe: slope, percs slowly.	Severe: slope	Severe: slope, depth to rock.	Severe: slope	Poor: slope.
Xerorthents, sandy: Xb	Severe: slope	Severe: slope, seepage.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
Xerorthents, loamy: Xc	Severe: slope, percs slowly.	Severe: slope	Severe: slope	Severe: slope	Poor: slope.
Xerorthents, dissected: Xd.	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope.
Xerorthents, shallow	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.		Poor: thin layer, slope.

TABLE 11.—*Ratings of soils as construction sites*

["Shrink-swell," "low strength," and other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil which may have different properties and limitations. For this reason it is necessary to follow carefully the instructions for referring to other series that appear in the first column]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Roads and streets
*Alo:					
AaC	Severe: too clayey, depth to rock.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength, depth to rock.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
AaD	Severe: too clayey, depth to rock.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength, depth to rock.	Severe: shrink-swell, low strength, slope.	Severe: shrink-swell, low strength.
AaE, AaF, Ab. For Millsholm part of Ab, see Millsholm series.	Severe: too clayey, depth to rock, slope.	Severe: shrink-swell, low strength, slope.	Severe: shrink-swell, depth to rock, slope.	Severe: shrink-swell, low strength, slope.	Severe: shrink-swell, low strength, slope.
Alviso:					
Ac	Severe: wetness, floods, too clayey.	Severe: wetness, shrink-swell, floods.	Severe: wetness, shrink-swell, floods.	Severe: wetness, shrink-swell, floods.	Severe: wetness, shrink-swell, floods.
Ad	Severe: wetness, too clayey.	Severe: wetness, shrink-swell, floods.	Severe: wetness, shrink-swell, floods.	Severe: wetness, shrink-swell, floods.	Severe: wetness, shrink-swell, low strength.
Antioch:					
AeA, AeC	Moderate: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: low strength, shrink-swell.
AeD	Moderate: slope, too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: slope, shrink-swell, low strength.	Severe: low strength, shrink-swell.
Aquic Xerofluvents: Af	Severe: floods	Severe: floods	Severe: floods	Severe: floods	Severe: floods.
Arbuckle:					
AgC	Moderate: small stones.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell.
AgD	Moderate: small stones.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, slope.	Severe: slope	Moderate: shrink-swell, slope.
Arbuckle part of PoE	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Arnold:					
AkD	Severe: too sandy, cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope	Moderate: slope.
AkF, Am, Ar. For San Andreas part of Am, see San Andreas series. For Santa Ynez part of Ar, see ShE in Santa Ynez series.	Severe: too sandy, cutbanks cave, slope.	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Arroyo Seco:					
AsA, AsB, AvA, AvB	Moderate: small stones.	Slight	Slight	Slight	Slight.
AsC	Moderate: small stones.	Slight	Slight	Moderate: slope.	Slight.

TABLE 11.—*Ratings of soils as construction sites*—Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Roads and streets
Ayar:					
AyD	Severe: too clayey.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.	Severe: low strength, shrink-swell.
AyE, AyF	Severe: slope, too clayey.	Severe: slope, low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.
Badland: Ba. No ratings.					
Baywood: BbC	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope	Moderate: slope.
Chamise:					
CaD	Moderate: slope, small stones.	Moderate: slope.	Moderate: slope.	Severe: slope	Moderate: slope, low strength.
CaE, CaF	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Chualar:					
CbA, CbB	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.
CbC	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Moderate: shrink-swell, low strength.
*Cieneba: CcG, Cd, Ce. No ratings for Rock outcrop part of Cd and Ce. For Sur part of Ce, see Sur series.	Severe: slope, depth to rock.	Severe: slope	Severe: slope, depth to rock.	Severe: slope	Severe: slope.
Clear Lake:					
Cf	Severe: floods, wetness.	Severe: floods, shrink-swell, low strength.	Severe: floods, shrink-swell, low strength.	Severe: floods, shrink-swell, low strength.	Severe: floods, wetness, shrink-swell.
Cg	Severe: floods, wetness.	Severe: floods, shrink-swell, low strength.	Severe: floods, wetness, shrink-swell.	Severe: floods, shrink-swell, low strength.	Severe: wetness, floods, shrink-swell.
*Climara: ChE, ChF, Ck. For Montara part of Ck, see Montara series.	Severe: slope, depth to rock, too clayey.	Severe: slope, shrink-swell, low strength.	Severe: slope, depth to rock, shrink-swell.	Severe: slope, shrink-swell, low strength.	Severe: slope, depth to rock, shrink-swell.
Coastal beaches: Cm. No ratings.					
Cropley: CnA, CnC	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Danville: DaA, DaC	Moderate: too clayey.	Severe: shrink-swell, low strength.	Moderate: shrink-swell, low strength,	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Diablo:					
DbD	Severe: depth to rock, too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: slope, shrink-swell, low strength.	Severe: shrink-swell, low strength.
DbE, DbF	Severe: slope, depth to rock, too clayey.	Severe: slope, shrink-swell, low strength.	Severe: slope, low strength, shrink-swell.	Severe: slope, shrink-swell, low strength.	Severe: slope, shrink-swell, low strength.

TABLE 11.—*Ratings of soils as construction sites*—Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Roads and streets
Dibble:					
DcC	Severe: depth to rock, too clayey.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.
DdB	Severe: depth to rock, too clayey.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.	Severe: low strength, shrink-swell.
DdE, DdF	Severe: slope, depth to rock, too clayey.	Severe: slope, low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.
Docas:					
DeA	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.
DeC	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Moderate: shrink-swell, low strength.
Dune land: Df. No ratings.					
Elder:					
EaA	Slight	Slight	Slight	Slight	Slight.
EbC	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength.
EcA	Moderate: small stones.	Slight	Slight	Slight	Moderate: low strength.
Elkhorn:					
EdB, EdC	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.
EdD	Moderate: slope.	Moderate: slope, shrink-swell.	Moderate: shrink-swell, slope.	Severe: slope	Moderate: slope, shrink-swell.
Elkhorn variant:					
EeD	Moderate: slope, depth to rock.	Moderate: slope, shrink-swell.	Moderate: slope, depth to rock, shrink-swell.	Severe: slope	Moderate: slope, low strength.
EeE	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Fluvents, stony: Fa	Severe: large stones, floods.	Severe: large stones, floods.	Severe: large stones, floods.	Severe: large stones, floods.	Severe: large stones, floods.
*Gamboa: Ga. For Sur and Junipero parts, see those series.	Severe: slope, small stones.	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
*Garey:					
GbC	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength.
GbE, GbF2, Gc. For Oceano part of Gc, see Oceano series.	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
*Gaviota: GdE, GdF, GeE, GeG. For San Andreas part of GeE and GeG see San Andreas series.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.

TABLE 11.—*Ratings of soils as construction sites*—Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Roads and streets
Gazos: GfE, GfF	Severe: slope, depth to rock.	Severe: slope	Severe: slope, depth to rock.	Severe: slope	Severe: slope.
Gilroy: GgE, GgG2	Severe: slope	Severe: slope	Severe: slope, depth to rock.	Severe: slope	Severe: low strength, slope.
Gloria:					
GhC	Severe: cemented pan.	Severe: low strength, shrink-swell.	Severe: cemented pan, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength.
GhD	Severe: cemented pan.	Severe: low strength, shrink-swell.	Severe: cemented pan, shrink-swell.	Severe: low strength, shrink-swell, slope.	Severe: low strength.
GhF	Severe: slope, cemented pan.	Severe: low strength, shrink-swell, slope.	Severe: slope, cemented pan, shrink-swell.	Severe: low strength, shrink-swell, slope.	Severe: slope, low strength.
Gorgonio: GkB	Severe: too sandy.	Slight	Slight	Slight	Slight.
Greenfield:					
GmB	Slight	Slight	Slight	Slight	Moderate: low strength.
GmC	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength.
GmD	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope	Moderate: slope, low strength.
Greenfield part of SpE2	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Haire: HaE	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope, low strength.
Hanford: HbB	Moderate: small stones.	Slight	Slight	Slight	Slight.
Henneke: HcF	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.	Severe: slope, depth to rock, large stones.
*Junipero: JaF, JbG, Jc. For Sur part of Jc, see Sur series.	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
*Linne:					
LaD, LbD. For Diablo part of LbD, see DbD in Diablo series.	Moderate: slope, too clayey, depth to rock.	Moderate: slope, shrink-swell.	Moderate: slope, depth to rock, shrink-swell.	Severe: slope	Severe: low strength.
LaE, LaF, LbE, LcE, LcF2, LcF, LcG2. For Diablo part of LbE, LcF, and LcG2, see DbE, DbF in Diablo series. For Shedd part of LcE, LcF2, LcF, and LcG2, see SmE in Shedd series.	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope, low strength.

TABLE 11.—*Ratings of soils as construction sites*—Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Roads and streets
Lockwood:					
LdA	Moderate: too clayey.	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Severe: low strength.
LdC	Moderate: too clayey.	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: slope, low strength, shrink-swell.	Severe: low strength.
LeA	Moderate: small stones.	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Severe: low strength.
LeC	Moderate: small stones.	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: slope, low strength, shrink-swell.	Severe: low strength.
LeD	Moderate: slope, small stones.	Moderate: slope, low strength, shrink-swell.	Moderate: slope, low strength, shrink-swell.	Severe: slope	Severe: low strength.
LgA	Moderate: wetness, too clayey, small stones.	Moderate: shrink-swell, low strength.	Severe: wetness.	Moderate: shrink-swell, low strength.	Severe: low strength.
Lopez: LhE	Severe: slope, depth to rock, small stones.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Los Gatos: LkF, LkG	Severe: slope, depth to rock.	Severe: slope	Severe: slope, depth to rock.	Severe: slope	Severe: slope, low strength.
*Los Osos:					
LmD	Severe: depth to rock, too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, depth to rock, low strength.	Severe: slope, shrink-swell, low strength.	Severe: low strength, shrink-swell.
LmE, LmF, LmG, Ln. For Millsholm part of Ln, see Millsholm series.	Severe: slope, depth to rock, too clayey.	Severe: slope, shrink-swell, low strength.	Severe: slope, shrink-swell, depth to rock.	Severe: slope, shrink-swell, low strength.	Severe: slope, low strength, shrink-swell.
*McCoy: MaE, MaF, MaG, MbE, MbG. For Gilroy part of MbE and MbG, see Gilroy series.	Severe: slope, depth to rock.	Severe: slope, shrink-swell.	Severe: slope, depth to rock.	Severe: slope, shrink-swell.	Severe: slope, low strength.
McCoy variant: McG	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.
*McMullin: Md. For Plaskett part, see Plaskett series.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Metz:					
Me, Mf	Slight	Slight	Slight	Slight	Slight.
Mg	Slight	Slight	Slight	Moderate: slope.	Slight.

TABLE 11.—*Ratings of soils as construction sites*—Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Roads and streets
*Millsholm: MhG, Mk, Mm. For Alo part of Mk, see Ab in Alo series. For Gazos part of Mm, see Gazos series.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, low strength.
Mocho:					
MnA	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.
MoA	Slight	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength.
MoC	Slight	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: slope, low strength.	Severe: low strength.
Montara: Mp. No ratings for Rock outcrop.	Severe: slope, depth to rock.	Severe: slope, depth to rock, low strength.	Severe: slope, depth to rock, low strength.	Severe: slope, depth to rock, low strength.	Severe: slope, depth to rock, low strength.
*Nacimiento:					
NaD	Moderate: slope, depth to rock, too clayey.	Moderate: slope, shrink-swell, low strength.	Moderate: slope, depth to rock, low strength.	Severe: slope	Severe: low strength.
NaE, NaF, NaG, NbF, NbG. For Los Osos part of NbF, NbG, see LmF in Los Osos series. For San Benito part, see San Benito series.	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope, low strength.
Narlon:					
NcC	Severe: too clayey, wetness.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, low strength, wetness.	Severe: shrink-swell, low strength, wetness.	Severe: wetness.
NcE	Severe: slope, too clayey, wetness.	Severe: slope, low strength, wetness.	Severe: slope, low strength, wetness.	Severe: slope, low strength, wetness.	Severe: wetness, slope.
Oceano:					
OaD	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope	Moderate: slope.
Oceano part of Gc	Severe: slope, cutbanks cave.	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Pacheco:					
Pa	Severe: wetness.	Moderate: shrink-swell, low strength.	Moderate: wetness, shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength.
Pb	Severe: floods	Severe: floods	Severe: floods	Severe: floods	Severe: low strength.
Parkfield:					
PcC	Severe: depth to rock.	Severe: shrink-swell.	Severe: shrink-swell, depth to rock.	Severe: shrink-swell.	Severe: low strength, shrink-swell.

TABLE 11.—*Ratings of soils as construction sites*—Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Roads and streets
Parkfield—Con.					
PcE	Severe: depth to rock, slope.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell, depth to rock.	Severe: slope, shrink-swell.	Severe: slope, low strength, shrink-swell.
Pfeiffer:					
PdC	Slight	Slight	Slight	Moderate: slope.	Slight.
PdD	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope	Moderate: slope.
Pe No ratings for Rock outcrop part.	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Pico: Pf	Slight	Slight	Slight	Slight	Slight.
Pinnacles:					
PgE	Severe: slope	Severe: slope, low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.
PhG2	Severe: slope, large stones, too clayey.	Severe: slope, low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.
Pinnacles variant: PkE, PkF.	Severe: slope, small stones.	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Pits and dumps: Pm. No ratings.					
*Placentia:					
PnA, PnC	Severe: too clayey.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.
PnD	Severe: too clayey.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.	Severe: low strength, shrink-swell.
PnE, PoE For Arbuckle part of PoE, see Arbuckle series.	Severe: slope, too clayey.	Severe: slope, low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.
*Plaskett: Pp For Reliz part, see Reliz series.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Psamments and Fluvents, flooded: Pr, Ps.					
Psamments part	Severe: floods, cutbanks cave, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.
Fluvents part	Severe: floods, small stones, cutbanks cave.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.
Reliz	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.
Rincon:					
RaA, RaC	Moderate: too clayey.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.

TABLE 11.—*Ratings of soils as construction sites*—Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Roads and streets
Rincon—Con.					
RaD	Moderate: slope, too clayey.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.	Severe: low strength, shrink-swell.
RaE	Severe: slope	Severe: slope, low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.
Rindge: Rb	Severe: wetness, floods, excess humus.	Severe: wetness, floods, low strength.	Severe: wetness, floods, low strength.	Severe: wetness, floods, low strength.	Severe: wetness, floods, low strength.
Rock outcrop: Rc. Rock outcrop not rated. For Xerorthents part, see Xerorthents, shallow.					
Salinas:					
SaA	Slight	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.
SbA	Moderate: too clayey.	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Severe: low strength.
SbC	Moderate: too clayey.	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell, slope.	Severe: low strength.
San Andreas: ScE, ScG	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
San Benito: SdF, SdG	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
San Timoteo: SeG	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
*Santa Lucia:					
SfD	Severe: depth to rock, small stones.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope	Moderate: slope, depth to rock.
SfE, SfF, Sg. For Reliz and Lopez parts of Sg, see Reliz and Lopez series.	Severe: slope, depth to rock, small stones.	Severe: slope	Severe: slope, depth to rock.	Severe: slope	Severe: slope.
Santa Ynez:					
ShC	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
ShD, ShD2	Moderate: slope, too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: slope, shrink-swell.	Severe: low strength, shrink-swell.
ShE	Severe: slope	Severe: slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell.	Severe: slope, low strength, shrink-swell.
Shedd:					
SmG3	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
SnD	Moderate: slope, too clayey, depth to rock.	Moderate: slope, low strength, shrink-swell.	Moderate: slope, low strength, depth to rock.	Severe: slope	Severe: low strength.
SnE, SnF2	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope, low strength.

TABLE 11.—*Ratings of soils as construction sites*—Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Roads and streets
Sheridan:					
SoD	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope	Moderate: slope.
SoE, SoG	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
*Snelling:					
SpD. For Greenfield part, see GmD in Greenfield series.	Moderate: slope.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: shrink-swell.	Moderate: slope, low strength, shrink-swell.
SpE2. For Greenfield part, see Greenfield series.	Severe: slope	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: slope.
Sorrento:					
SrA	Moderate: too clayey.	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Severe: low strength.
SrC	Moderate: too clayey.	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell.	Moderate: low strength, shrink-swell, slope.	Severe: low strength.
*Sur: Ss, St. For Junipero part of Ss and Plaskett part of St, see those series.	Severe: slope, depth to rock, large stones.	Severe: slope, large stones.	Severe: slope, large stones, depth to rock.	Severe: slope, large stones.	Severe: slope, large stones.
Tangair: TaC	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Tujunga: TbB	Severe: cutbanks cave.	Slight	Slight	Slight	Slight.
Vista:					
VaD	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope	Moderate: slope.
VaE, VaG, Vb. No ratings for Rock outcrop part of Vb.	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Xererts-Xerolls complex: Xa.					
Xererts part	Severe: slope, too clayey.	Severe: slope, shrink-swell, low strength.	Severe: slope, shrink-swell, low strength.	Severe: slope, shrink-swell, low strength.	Severe: slope, shrink-swell, low strength.
Xerolls part	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope, low strength.
Xerorthents, sandy: Xb	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Xerorthents, loamy: Xc	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: low strength, slope.
Xerorthents, dissected: Xd.	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Xerorthents, shallow	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.

TABLE 12.—*Ratings of soils as sources of construction material*

["Shrink-swell," "thin layer," and other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and "poor." An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil which may have different properties and limitations. For this reason it is necessary to follow carefully the instructions for referring to other series that appear in the first column]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
*Alo:				
AaC, AaD	Poor: shrink-swell, low strength, thin layer.	Unsuited	Unsuited	Poor: too clayey.
AaE	Poor: shrink-swell, low strength, thin layer.	Unsuited	Unsuited	Poor: too clayey, slope.
AaF, Ab. For Millsholm part of Ab, see Millsholm series.	Poor: low strength, thin layer, slope.	Unsuited	Unsuited	Poor: too clayey, slope.
Alviso: Ac, Ad	Poor: wetness, shrink-swell, low strength.	Unsuited	Unsuited	Poor: wetness, too clayey, excess salt.
Antioch:				
AeA, AeC	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Good.
AeD	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Fair: slope.
Aquic Xerofluvents: Af. No ratings.				
Arbuckle:				
AgC, AgD	Fair: shrink-swell, too clayey.	Unsuited	Unsuited	Poor: small stones.
Arbuckle part of PoE	Fair: shrink-swell, too clayey, slope.	Unsuited	Unsuited	Poor: small stones.
*Arnold:				
AkD	Good	Fair	Unsuited	Poor: too sandy.
AkF, Am. For San Andreas part of Am, see ScG in San Andreas series.	Poor: slope	Fair	Unsuited	Poor: too sandy, slope.
Ar. For Santa Ynez part, see ShE in Santa Ynez series.	Fair: slope	Fair	Unsuited	Poor: too sandy, slope.
Arroyo Seco: AsA, AsB, AsC, AvA, AvB.	Good	Poor: excess fines.	Poor: excess fines.	Poor: small stones.
Ayar:				
AyD	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Poor: too clayey.
AyE	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Poor: slope, too clayey.
AyF	Poor: slope, low strength, shrink-swell.	Unsuited	Unsuited	Poor: slope, too clayey.
Badland: Ba. No ratings.				
Baywood: BbC	Good	Poor: excess fines.	Unsuited	Poor: too sandy.
Chamise:				
CaD	Fair: low strength	Unsuited	Unsuited	Poor.
CaE	Fair: slope, low strength.	Unsuited	Unsuited	Poor: slope, excess fines.

TABLE 12.—*Ratings of soils as sources of construction material*—Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Chamise—Con.				
CaF	Poor: slope	Unsuited	Unsuited	Poor: slope, excess fines.
Chualar: CbA, CbB, CbC	Fair: shrink-swell, low strength.	Unsuited	Unsuited	Fair: small stones.
*Cieneba: CcG, Cd, Ce. No ratings for Rock outcrop part of Cd and Ce. For Sur part of Ce, see Sur series.	Poor: slope, thin layer	Unsuited: thin layer.	Unsuited	Poor: slope, small stones, thin layer.
Clear Lake:				
Cf	Poor: wetness, low strength, shrink-swell.	Unsuited	Unsuited	Poor: wetness, too clayey, excess salt.
Cg	Poor: shrink-swell, low strength, wetness.	Unsuited	Unsuited	Poor: too clayey, wetness.
*Climara:				
ChE	Poor: thin layer, low strength, shrink-swell.	Unsuited	Unsuited	Poor: slope, too clayey, area reclaim.
ChF, Ck. For Montara part of Ck, see Montara series.	Poor: slope, thin layer, low strength.	Unsuited	Unsuited	Poor: slope, too clayey, area reclaim.
Coastal beaches: Cm. No ratings.				
Cropley: CnA, CnC	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Poor: too clayey.
Danville: DaA, DaC	Fair: shrink-swell, low strength.	Unsuited	Unsuited	Fair: too clayey, small stones.
Diablo:				
DbD	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Poor: too clayey.
DbE	Poor: shrink-swell, low strength.	Unsuited	Unsuited	Poor: slope, too clayey.
DbF	Poor: slope, shrink-swell, low strength.	Unsuited	Unsuited	Poor: slope, too clayey.
Dibble:				
DcC, DdB	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Poor: thin layer.
DdE, DdF	Poor: slope, low strength, shrink-swell.	Unsuited	Unsuited	Poor: slope, thin layer.
Docas: DeA, DeC	Fair: shrink-swell, low strength.	Unsuited	Unsuited	Fair: too clayey, excess lime.
Dune land: Df. No ratings.				
Elder:				
EaA	Good	Fair: excess fines.	Unsuited	Good.
EbC	Fair: low strength	Unsuited	Unsuited	Good.
EcA	Fair: low strength	Good	Good	Good.
Elkhorn:				
EdB, EdC	Good	Unsuited	Unsuited	Good.
EdD	Good	Unsuited	Unsuited	Fair: slope.

TABLE 12.—*Ratings of soils as sources of construction material*—Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Elkhorn variant:				
EeD	Poor: thin layer	Unsuited	Unsuited	Fair: slope, thin layer.
EeE	Poor: slope, thin layer	Unsuited	Unsuited	Poor: slope.
Fluvents, stony: Fa	Poor: large stones	Poor: large stones.	Unsuited	Poor: large stones, too sandy.
*Gamboa: Ga For Sur and Junipero parts, see those series.	Poor: slope	Unsuited	Poor: excess fines.	Poor: slope, small stones.
*Garey:				
GbC	Fair: low strength	Poor: excess fines.	Unsuited	Good.
GbE	Fair: slope, low strength.	Poor: excess fines.	Unsuited	Poor: slope.
GbF2, Gc For Oceano part of Gc, see Oceano series.	Poor: slope	Poor: excess fines.	Unsuited	Poor: slope.
*Gaviota:				
GdE, GeE For San Andreas part of GeE, see ScE in San Andreas series.	Poor: thin layer	Unsuited	Unsuited	Poor: slope.
GdF, GeG For San Andreas part of GeG, see ScG in San Andreas series.	Poor: slope, thin layer	Unsuited	Unsuited	Poor: slope.
Gazos:				
GfE	Poor: thin layer	Unsuited	Unsuited	Poor: slope.
GfF	Poor: thin layer, slope	Unsuited	Unsuited	Poor: slope.
Gilroy:				
GgE, GgG2	Poor: low strength, thin layer, slope.	Unsuited	Unsuited	Poor: slope, small stones.
Gilroy part of MbE	Poor: low strength, thin layer.	Unsuited	Unsuited	Poor: slope, small stones.
Gloria:				
GhC, GhD	Poor: thin layer, low strength.	Unsuited	Unsuited	Fair: thin layer, area reclaim.
GhF	Poor: thin layer, low strength, slope.	Unsuited	Unsuited	Poor: slope.
Gorgonio: GkB	Good	Poor: excess fines.	Unsuited	Poor: small stones.
Greenfield:				
GmB, GmC	Fair: low strength	Unsuited	Unsuited	Fair: small stones.
GmD	Fair: low strength	Unsuited	Unsuited	Fair: slope, small stones.
Greenfield part of SpE2	Fair: low strength, slope.	Unsuited	Unsuited	Poor: slope.
Haire: HaE	Poor: low strength	Unsuited	Unsuited	Poor: slope.
Hanford: HbB	Good	Poor: excess fines.	Unsuited	Poor: small stones.
Henneke: HcF	Poor: slope, thin layer, large stones.	Unsuited	Unsuited	Poor: slope, thin layer, large stones.

TABLE 12.—*Ratings of soils as sources of construction material*—Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
*Junipero: JaF, JbG, Jc. For Sur part of Jc, see Sur series.	Poor: slope, thin layer	Unsuited	Unsuited	Poor: slope.
*Linne: LaD, LbD. For Diablo part of LbD, see DbD in Diablo series.	Poor: thin layer, low strength.	Unsuited	Unsuited	Fair: slope, too clayey, small stones.
LaE, LbE, LcE. For Diablo part of LbE, see DbE in Diablo series. For Shedd part of LcE, see SmE in Shedd series.	Poor: thin layer, low strength.	Unsuited	Unsuited	Poor: slope.
LaF, LcF, LcG2, LcF2. For Diablo part of LcF and LcG2, see DbF in Diablo series. For Shedd part of LcF, LcG2, and LcF2, see SnF2 in Shedd series.	Poor: slope, thin layer, low strength.	Unsuited	Unsuited	Poor: slope.
Lockwood: LdA, LdC	Poor: low strength	Unsuited	Unsuited	Fair: small stones.
LeA, LeC, LeD, LgA	Poor: low strength	Unsuited	Unsuited	Poor: small stones.
Lopez: LhE	Poor: thin layer	Unsuited	Unsuited: thin layer.	Poor: slope, small stones, thin layer.
Los Gatos: LkF, LkG	Poor: slope, low strength.	Unsuited	Unsuited	Poor: slope, small stones.
*Los Osos: LmD	Poor: low strength, shrink-swell, thin layer.	Unsuited	Unsuited	Fair: slope, too clayey.
LmE	Poor: low strength, shrink-swell, thin layer.	Unsuited	Unsuited	Poor: slope.
LmF, LmG, Ln. For Millsholm part of Ln, see Millsholm series.	Poor: low strength, thin layer, slope.	Unsuited	Unsuited	Poor: slope.
*McCoy: MaE, MbE. For Gilroy part of MbE, see Gilroy series.	Poor: low strength, thin layer.	Unsuited	Unsuited	Poor: slope.
MaF, MaG, MbG. For Gilroy part of MbG, see Gilroy series.	Poor: slope, low strength, thin layer.	Unsuited	Unsuited	Poor: slope.
McCoy variant: McG	Poor: slope, large stones.	Unsuited	Unsuited	Poor: slope, large stones, small stones.
*McMullin: Md. For Plaskett part, see Plaskett series.	Poor: slope, thin layer, area reclaim.	Unsuited	Unsuited	Poor: slope, small stones.
Metz: Me, loamy sand part of Mg	Good	Poor: excess fines.	Unsuited	Poor: too sandy.
Mf, fine sandy loam part of Mg	Good	Poor: excess fines.	Unsuited	Fair: thin layer.
*Millsholm: MhG, Mk, Mm. For Alo part of Mk, see Ab in Alo series. For Gazos part of Mm, see GfF in Gazos series.	Poor: slope, thin layer, low strength.	Unsuited	Unsuited	Poor: slope, thin layer.

TABLE 12.—*Ratings of soils as sources of construction material*—Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Mocho:				
MnA	Fair: shrink-swell, low strength.	Unsuited	Unsuited	Fair: excess lime.
MoA, MoC	Poor: low strength	Unsuited	Unsuited	Fair: too clayey, excess lime.
Montara: Mp. No ratings for Rock outcrop part.	Poor: slope, low strength, thin layer.	Unsuited	Unsuited	Poor: slope, area reclaim.
*Nacimiento:				
NaD	Poor: low strength	Unsuited	Unsuited	Fair: slope, too clayey, excess lime.
NaE	Poor: low strength	Unsuited	Unsuited	Poor: slope.
NaF, NaG, NbF, NbG. For Los Osos part of NbF and NbG, see LmF in Los Osos series. For San Benito part, see San Benito series.	Poor: slope, low strength.	Unsuited	Unsuited	Poor: slope.
Narlon:				
NcC	Poor: shrink-swell, low strength, wetness.	Unsuited	Unsuited	Poor: wetness.
NcE	Poor: shrink-swell, low strength, wetness.	Unsuited	Unsuited	Poor: wetness, slope.
Oceano:				
OaD	Good	Poor: excess fines.	Unsuited	Poor: too sandy.
Oceano part of Gc	Poor: slope	Poor: excess fines.	Unsuited	Poor: slope, too sandy.
Pacheco:				
Pa	Poor: low strength	Unsuited	Unsuited	Poor: excess salt.
Pb	Poor: low strength	Unsuited	Unsuited	Fair: excess salt, too clayey.
Parkfield:				
PcC	Poor: low strength, shrink-swell, thin layer.	Unsuited	Unsuited	Poor: too clayey.
PcE	Poor: low strength, shrink-swell, thin layer.	Unsuited	Unsuited	Poor: slope, too clayey.
Pfeiffer:				
PdC	Good	Poor: excess fines.	Poor: excess fines.	Fair: small stones.
PdD	Good	Poor: excess fines.	Poor: excess fines.	Fair: slope, small stones.
Pe. No ratings for Rock outcrop part.	Poor: slope	Poor: excess fines.	Poor: excess fines.	Poor: slope, small stones.
Pico: Pf	Good	Poor: excess fines.	Unsuited	Good.
Pinnacles:				
PgE	Poor: low strength, shrink-swell, thin layer.	Unsuited	Unsuited	Poor: slope.
PhG2	Poor: low strength, thin layer, slope.	Unsuited	Unsuited	Poor: slope, small stones, large stones.
Pinnacles variant:				
PkE	Poor: slope	Unsuited	Unsuited	Poor: slope, small stones.

TABLE 12.—*Ratings of soils as sources of construction material*—Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Pinnacles variant—Con. PkF	Poor: slope	Unsuited	Unsuited	Poor: slope, small stones.
Pits and dumps: Pm. No ratings.				
*Placentia: PnA	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Good.
PnC	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Fair: thin layer, area reclaim.
PnD	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Fair: slope, thin layer, area reclaim.
PnE, PoE For Arbuckle part of PoE, see Arbuckle series.	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Poor: slope.
*Plaskett: Pp For Reliz part, see Reliz series.	Poor: slope, thin layer	Unsuited	Unsuited: thin layer.	Poor: slope, small stones.
Psamments and Fluvents, flooded: Pr, Ps. Psamments part	Poor: wetness	Good	Good	Poor: too sandy.
Fluvents part	Poor: wetness	Good	Good	Poor: large stones, wetness, too sandy.
Reliz	Poor: slope, thin layer	Unsuited	Unsuited	Poor: slope, small stones.
Rincon: RaA, RaC	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Fair: too clayey.
RaD	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Fair: too clayey, slope.
RaE	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Poor: slope.
Rindge: Rb	Poor: wetness, excess humus, low strength.	Unsuited	Unsuited	Poor: wetness.
*Rock outcrop: Rc. No ratings for Rock outcrop. For Xerorthents part, see Xerorthents, shallow.				
Salinas: SaA	Fair: low strength	Unsuited	Unsuited	Fair: excess lime.
SbA, SbC	Poor: low strength	Unsuited	Unsuited	Fair: too clayey, excess lime.
San Andreas: ScE	Poor: thin layer	Unsuited	Unsuited	Poor: slope.
ScG	Poor: slope, thin layer	Unsuited	Unsuited	Poor: slope.
San Benito: SdF, SdG	Poor: slope, low strength.	Unsuited	Unsuited	Poor: slope.
San Timoteo: SeG	Poor: slope, thin layer	Unsuited	Unsuited	Poor: slope, small stones, excess lime.
*Santa Lucia: SfD	Poor: thin layer	Unsuited	Unsuited: thin layer.	Poor: small stones.
SfE	Poor: thin layer	Unsuited	Unsuited: thin layer.	Poor: slope, small stones.

TABLE 12.—*Ratings of soils as sources of construction material*—Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Santa Lucia—Con.				
SfF, Sg. For Reliz and Lopez parts of Sg, see those series.	Poor: slope, thin layer	Unsuited	Unsuited: thin layer.	Poor: slope, small stones.
Santa Ynez:				
ShC, ShD, ShD2	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Poor: small stones.
ShE	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Poor: slope, small stones.
Shedd:				
SmG3	Poor: slope, thin layer	Unsuited	Unsuited	Poor: slope, excess lime.
SnD	Poor: low strength, thin layer.	Unsuited	Unsuited	Poor: excess lime.
SnE	Poor: low strength, thin layer.	Unsuited	Unsuited	Poor: slope, excess lime.
SnF2	Poor: slope, low strength, thin layer.	Unsuited	Unsuited	Poor: slope, excess lime.
Sheridan:				
SoD	Poor: thin layer	Unsuited: thin layer.	Unsuited	Fair: slope.
SoE	Poor: thin layer	Unsuited: thin layer.	Unsuited	Poor: slope.
SoG	Poor: slope, thin layer	Unsuited: thin layer.	Unsuited	Poor: slope.
*Snelling:				
SpD. For Greenfield part, see GmD in Greenfield series.	Fair: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited	Fair: slope, small stones.
SpE2. For Greenfield part, see Greenfield series.	Fair: slope, low strength, shrink-swell.	Unsuited: excess fines.	Unsuited	Poor: slope.
Sorrento: SrA, SrC	Poor: low strength	Unsuited	Unsuited	Fair: too clayey.
*Sur: Ss, St. For Junipero part of Ss and Plaskett part of St, see those series.	Poor: slope, thin layer, large stones.	Unsuited	Unsuited: thin layer, large stones.	Poor: slope, small stones, large stones.
Tangair: TaC	Poor: wetness	Fair: excess fines.	Unsuited	Poor: wetness, too sandy.
Tujunga: TbB	Good	Fair: excess fines.	Unsuited	Poor: too sandy.
Vista:				
VaD	Good	Unsuited: thin layer.	Unsuited	Fair: slope.
VaE	Fair: slope	Unsuited: thin layer.	Unsuited	Poor: slope.
VaG, Vb. No ratings for Rock outcrop part of Vb.	Poor: slope	Unsuited: thin layer.	Unsuited	Poor: slope.
Xererts-Xerolls complex: Xa.				
Xererts part	Poor: slope, shink-swell, low strength.	Unsuited	Unsuited	Poor: slope, too clayey.
Xerolls part	Poor: slope, low strength.	Unsuited	Unsuited	Poor: slope.

TABLE 12.—*Ratings of soils as sources of construction material*—Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Xerorthents, sandy: Xb	Poor: slope	Poor: excess fines.	Unsuited	Poor: slope.
Xerorthents, loamy: Xc	Poor: low strength, slope.	Unsuited	Unsuited	Poor: slope.
Xerorthents, dissected: Xd	Poor: slope			Severe: slope.
Xerorthents, shallow	Poor: thin layer, slope	Unsuited: thin layer.	Unsuited: thin layer.	Poor: slope, thin layer.

mation about the nature of each horizon that can help determine its suitability for roadfill.

According to the Unified soil classification system, soils rated *good* have low shrink-swell potential, low potential frost action, and few cobbles and stones. They are at least moderately well drained and have slopes of 15 percent or less. Soils rated *fair* have a plasticity index of less than 15 and have other limiting features, such as high shrink-swell potential, high potential frost action, steep slopes, wetness, or many stones. If the thickness of suitable material is less than 3 feet, the entire soil is rated *poor*, regardless of the quality of the suitable material.

Sand and gravel are used in great quantities in many kinds of construction. The ratings in table 12 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good* or *fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, kinds of minerals, reaction, and stratification are given in the soil series descriptions and in table 6.

Topsoil is used in areas where vegetation is to be established and maintained. Suitability is affected mainly by the ease of working and spreading the soil material in preparing a seedbed and by the ability of the soil material to sustain the growth of plants. Also considered is the damage that would result to the area from which the topsoil is taken.

Soils rated *good* have at least 16 inches of friable loamy material at their surface. They are free of stones, are low in content of gravel and other coarse fragments, and have gentle slopes. They are low in soluble salts, which can limit plant growth. They are naturally fertile or respond well to fertilization. They are not so wet that excavation is difficult during most of the year. Soils rated *fair* are those that are loose and sandy or firm and loamy or clayey, in which the suitable material is only 8 to 16 inches thick, or those that have appreciable amounts of gravel, stones, or soluble salt. Soils rated *poor* are very sandy soils, very firm clayey soils, soils with suitable layers less than 8 inches thick, soils having large amounts of gravel, stones, or soluble salt, steep soils, and poorly drained soils.

Although a rating of *good* is not based entirely on high content of organic matter, a surface horizon with high organic-matter content is much preferred for topsoil. This horizon is designated as A1 or Ap in the soil series descriptions. The absorption and retention of moisture and nutrients for plant growth are greatly increased by organic-matter content. Consequently, careful preservation and use of material from these horizons is desirable.

Water management

Many soil properties and site features that affect water management have been identified in this soil survey. In table 13 soil properties and site features that affect use are indicated for each kind of soil. This information is significant in planning, installing, and maintaining water control structures.

Pond reservoir areas hold water behind a dam or embankment. Soils suitable for this use have low seepage potential, which is determined by permeability and depth to fractured or permeable bedrock or other permeable material.

Embankments, dikes, and levees require soil material that is resistant to seepage, erosion, and piping and has favorable stability, shrink-swell potential, shear strength, and compaction characteristics. Stones and organic matter in a soil lessen the suitability of a soil for use in embankments, dikes, and levees.

Drainage is affected by such soil properties as permeability, texture, structure, depth to claypan or other layers that influence rate of water movement, depth to the water table, slope, stability of ditchbanks, susceptibility to flooding, salinity and alkalinity, and availability of outlets for drainage.

Irrigation is affected by such features as slope, susceptibility to flooding, hazards of water erosion and soil blowing, texture, presence of salts and alkali, depth of root zone, rate of water intake at the surface, permeability of the soil below the surface layer, available water capacity, need for drainage, and depth to the water table.

Terraces and diversions are embankments, or a combination of channels and ridges, constructed across a slope to intercept runoff and allow the water to soak into the soil or flow slowly to an outlet. Features that affect suitability of a soil for terraces are uniformity

TABLE 13.—*Water management*

["Seepage," and some of the other terms that describe restrictive soil features are defined in the Glossary. Absence of an entry means soil was not evaluated. An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil which may have different properties and limitations. For this reason it is necessary to follow carefully the instructions for referring to other series that appear in the first column]

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
*Alo:						
AaC, AaD, AaE, AaF.	Slope, depth to rock.	Low strength, thin layer, hard to pack.	Slope, percs slowly, depth to rock.	Slope, slow intake, percs slowly.	Slope, percs slowly, depth to rock.	Slope, percs slowly.
Ab. For Millsholm part, see Millsholm series.	Slope, depth to rock.	Low strength, thin layer, hard to pack.			Slope, percs slowly, depth to rock.	Slope, percs slowly.
Alviso:						
Ac	Wetness	Low strength, hard to pack.	Poor outlets, wetness, floods.	Wetness, excess salt, percs slowly.	Poor outlets, percs slowly, wetness.	Wetness, excess salt, percs slowly.
Ad	Wetness	Low strength, hard to pack, compressible.	Wetness, poor outlets.	Wetness, percs slowly, excess salt.	Wetness, percs slowly, poor outlets.	Wetness, percs slowly, excess salt.
Antioch:						
AeA	Favorable	Low strength, compressible, hard to pack.	Percs slowly	Percs slowly, rooting depth.	Percs slowly, rooting depth.	Percs slowly, rooting depth.
AeC	Slope	Low strength, compressible, hard to pack.	Slope, percs slowly.	Slope, percs slowly, rooting depth.	Percs slowly, rooting depth.	Percs slowly, rooting depth.
AeD	Slope	Low strength, compressible, hard to pack.	Slope, percs slowly.	Slope, percs slowly, rooting depth.	Slope, percs slowly, rooting depth.	Percs slowly, rooting depth.
Aquic Xerofluvents: Af.					Wetness	Wetness.
Arbuckle:						
AgC, AgD	Slope	Low strength	Slope	Slope	Favorable	Favorable.
Arbuckle part of PoE.	Slope	Low strength	Slope	Slope	Slope	Slope.
*Arnold:						
AkD, AkF, Am, Ar. For San Andreas part of Am, see San Andreas series. For Santa Ynez part of Ar, see ShD in Santa Ynez series.	Seepage, slope, depth to rock.	Seepage, piping.	Slope	Droughty, slope, seepage.	Depth to rock, slope, piping.	Slope, droughty, erodes easily.
Arroyo Seco:						
AsA, AvA	Seepage	Piping	Favorable	Droughty, fast intake.	Piping	Droughty.
AsB, AsC, AvB	Slope, seepage	Piping	Slope	Slope, droughty, fast intake.	Piping	Droughty.
Ayar: AyD, AyE, AyF.	Slope, depth to rock.	Low strength, compressible, hard to pack.	Slope, percs slowly.	Slope, slow intake, percs slowly.	Slope, percs slowly, depth to rock.	Slope, percs slowly.

TABLE 13.—*Water management*—Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
Dibble: DcC, DdB, DdE, DdF.	Slope, depth to rock.	Low strength, compressible, hard to pack.	Slope, percs slowly, depth to rock.	Slope, percs slowly, rooting depth.	Slope, percs slowly, depth to rock.	Slope, percs slowly, rooting depth.
Docas:						
DeA	Favorable	Low strength, hard to pack, piping.	Percs slowly	Favorable	Percs slowly	Slope, percs slowly.
DeC	Slope	Low strength, hard to pack, piping.	Slope, percs slowly.	Slope	Percs slowly	Slope, percs slowly.
Dune land: Df. No ratings.						
Elder:						
EaA	Seepage	Piping	Favorable	Droughty	Slope, piping	Slope.
EbC	Slope, seepage	Low strength, piping.	Slope	Slope	Slope, piping	Slope.
EcA	Seepage	Low strength, piping.	Seepage	Droughty	Piping	Droughty.
Elkhorn: EdB, EdC, EdD.	Slope	Piping	Slope, percs slowly.	Slope	Slope	Slope.
Elkhorn variant: EeD, EeE.	Slope, depth to rock.	Low strength, shrink-swell, thin layer.	Slope, depth to rock, percs slowly.	Slope, rooting depth, percs slowly.	Slope, percs slowly, depth to rock.	Slope, percs slowly, rooting depth.
Fluvents, stony: Fa	Seepage	Seepage	Floods	Floods, droughty.	Large stones, too sandy.	Large stones, droughty.
*Gamboa: Ga For Sur and Junipero parts, see those series.	Slope, seepage	Seepage, piping.			Depth to rock, slope.	Droughty, slope.
*Garey: GbC, GbE, GbF2, Gc. For Oceano part of Gc, see Oceano series.	Slope	Low strength, piping.	Slope, percs slowly.	Slope, droughty, percs slowly.	Slope, piping, percs slowly.	Slope, droughty, percs slowly.
*Gaviota: GdE, GdF, GeE, GeG. For San Andreas part of GeE and GeG, see San Andreas series.	Slope, depth to rock.	Slope, thin layer, piping.			Slope, depth to rock, piping.	Slope, rooting depth.
Gazos: GfE, GfF	Slope, depth to rock.	Low strength, piping, hard to pack.	Slope, depth to rock.	Slope, rooting depth.	Slope, depth to rock.	Slope, rooting depth.
Gazos part of Mm	Slope, depth to rock.	Low strength, piping, hard to pack.			Slope, depth to rock.	Slope, rooting depth.
Gilroy: GgE, GgG2	Slope, depth to rock.	Low strength, hard to pack, compressible.	Complex slope, depth to rock.	Complex slope, rooting depth.	Complex slope, depth to rock.	Slope, rooting depth.

TABLE 13.—*Water management*—Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
Badland: Ba. No ratings.						
Baywood: BbC	Slope, seepage	Piping	Slope, cutbanks cave.	Slope, droughty, fast intake.	Piping, too sandy, soil blowing.	Slope, droughty.
Chamise: CaD, CaE, CaF.	Slope	Favorable	Complex slope, percs slowly.	Complex slope, percs slowly.	Complex slope, percs slowly.	Slope, percs slowly.
Chualar:						
CbA	Seepage	Favorable	Favorable	Favorable	Favorable	Favorable.
CbB, CbC	Slope, seepage	Favorable	Slope	Slope	Favorable	Favorable.
*Cieneba:						
CcG	Slope, depth to rock, seepage.	Piping, thin layer.	Slope, depth to rock.	Slope, rooting depth, droughty.	Slope, depth to rock, piping.	Slope, rooting depth, droughty.
Cd, Ce. No ratings for Rock outcrop part. For Sur part of Ce, see Sur series.	Slope, depth to rock, seepage.	Piping, thin layer.			Slope, depth to rock, piping.	Slope, rooting depth, droughty.
Clear Lake:						
Cf	Favorable	Low strength, compressible, hard to pack.	Wetness, percs slowly.	Wetness, slow intake.	Wetness, percs slowly.	Wetness, percs slowly, excess salt.
Cg	Favorable	Low strength, hard to pack, piping.	Wetness, percs slowly, floods.	Wetness, floods, slow intake.	Wetness, piping.	Wetness.
*Climara:						
ChE, ChF, Ck. For Montara part of Ck, see Montara series.	Slope, depth to rock.	Low strength, compressible, thin layer.	Slope, percs slowly, depth to rock.		Slope, percs slowly, depth to rock.	Slope, rooting depth, percs slowly.
Coastal beaches: Cm. No ratings.						
Cropley:						
CnA	Favorable	Low strength, compressible, hard to pack.	Percs slowly	Slow intake, percs slowly.	Percs slowly	Percs slowly, slope.
CnC	Slope	Low strength, compressible, hard to pack.	Percs slowly, slope.	Slow intake, percs slowly, slope.	Percs slowly	Percs slowly, slope.
Danville:						
DaA	Favorable	Low strength, compressible, hard to pack.	Percs slowly	Percs slowly	Percs slowly	Slope, percs slowly.
DaC	Slope	Low strength, compressible, hard to pack.	Percs slowly, slope.	Percs slowly, slope.	Percs slowly	Slope, percs slowly.
Diablo: DbD, DbE, DbF.	Slope	Hard to pack, low strength, compressible.	Complex slope, percs slowly.	Complex slope, slow intake, percs slowly.	Complex slope, percs slowly.	Slope, percs slowly.

TABLE 13.—*Water management*—Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
Gloria: GhC, GhD, GhF.	Slope, cemented pan.	Hard to pack, low strength, compressible.	Slope, cemented pan, percs slowly.	Slope, rooting depth, percs slowly.	Slope, cemented pan, percs slowly.	Slope, percs slowly, rooting depth.
Gorgonio: GkB	Slope, seepage	Piping	Slope	Slope, fast intake, droughty.	Not needed	Slope, droughty.
Greenfield:						
GmC, GmB	Slope, seepage	Low strength, piping.	Slope	Slope	Favorable	Slope.
GmD	Slope, seepage	Low strength, piping.	Slope	Slope	Slope	Slope.
Haire: HaE	Slope	Low strength, compressible.	Slope, percs slowly,	Slope, percs slowly. slow intake.	Slope, percs slowly.	Slope, percs slowly.
Hanford: HbB	Slope, seepage	Piping	Slope	Slope, droughty.	Piping	Slope, droughty.
Henneke: HcF	Slope, depth to rock.	Thin layer, low strength, large stones.			Slope, depth to rock, large stones.	Slope, rooting depth, large stones.
*Junipero: JaF, JbG, Jc. For Sur part of Jc, see Sur series.	Slope, seepage, depth to rock.	Piping, thin layer.			Slope, depth to rock, piping.	Slope, rooting depth.
*Linne: LaD, LaE, LaF, LbD, LbE, LcE, LcF2, LcF, LcG2. For Diablo part of LbD, LbE, LcF, LcG2, see Diablo series. For Shedd part of LcE, LcF2, LcF, and LcG2, see SmF2 in Shedd series.	Slope, depth to rock.	Low strength, compressible, hard to pack.	Complex slope, depth to rock.	Complex slope, excess lime, rooting depth.	Complex slope, depth to rock.	Slope, rooting depth.
Lockwood:						
LdA	Favorable	Low strength, hard to pack, shrink-swell.	Percs slowly	Favorable	Slope, percs slowly.	Slope, percs slowly.
LdC	Slope	Low strength, hard to pack, shrink-swell.	Slope, percs slowly.	Slope	Slope, percs slowly.	Slope, percs slowly.
LeA	Favorable	Low strength, hard to pack, shrink-swell.	Percs slowly	Droughty	Slope, percs slowly.	Slope, percs slowly.
LeC, LeD	Slope	Low strength, hard to pack, shrink-swell.	Slope, percs slowly.	Slope, droughty.	Slope, percs slowly.	Slope, percs slowly.
LgA	Favorable	Low strength, hard to pack, shrink-swell.	Wetness, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.	Wetness, percs slowly.
Lopez: LhE	Slope, depth to rock.	Thin layer			Slope, depth to rock.	Slope, rooting depth.
Los Gatos: LkF, LkG	Slope, depth to rock.	Low strength, compressible, shrink-swell.	Slope, percs slowly, depth to rock.	Slope, percs slowly, rooting depth.	Slope, depth to rock, percs slowly.	Slope, percs slowly.

TABLE 13.—*Water management*—Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
*Los Osos: LmD, LmE, LmF, LmG.	Slope, depth to rock.	Low strength, thin layer.	Complex slope, depth to rock, percs slowly.	Complex slope, rooting depth, percs slowly.	Complex slope, depth to rock, percs slowly.	Slope, rooting depth, percs slowly.
Ln. For Millsholm part, see Millsholm series.	Slope, depth to rock.	Low strength, thin layer.			Complex slope, depth to rock, percs slowly.	Slope, rooting depth, percs slowly.
*McCoy: MaE, MaF, MaG, MbE, MbG. For Gilroy part of MbE and MbG, see Gilroy series.	Slope, depth to rock.	Thin layer, low strength, shrink-swell.	Complex slope, depth to rock, percs slowly.	Complex slope, percs slowly.	Complex slope, depth to rock, percs slowly.	Slope, percs slowly.
McCoy variant: McG	Slope, depth to rock, large stones.	Large stones			Slope, depth to rock, erodes easily.	Slope, depth to rock, erodes easily.
*McMullin: Md. For Plaskett part, see Plaskett series.	Slope, depth to rock.	Piping, hard to pack, thin layer.			Slope, depth to rock, piping.	Slope, rooting depth.
Metz:						
Me, Mf	Seepage	Piping, seepage.	Favorable	Fast intake, droughty.	Too sandy, piping, erodes easily.	Slope, droughty, erodes easily.
Mg	Slope, seepage	Piping, seepage.	Slope	Slope, fast intake, droughty.	Too sandy, piping, erodes easily.	Slope, droughty, erodes easily.
*Millsholm: MhG, Mk, Mm. For Alo part of Mk, see Ab in Alo series. For Gazos part of Mm, see Gazos series.	Slope, depth to rock.	Low strength, thin layer, compressible.			Depth to rock, slope.	Slope, rooting depth.
Mocho:						
MnA	Seepage	Piping, hard to pack.	Favorable	Favorable	Favorable	Favorable.
MoA	Favorable	Hard to pack, compressible.	Favorable	Favorable	Percs slowly	Percs slowly.
MoC	Slope	Hard to pack, compressible.	Slope	Slope	Percs slowly	Percs slowly.
Montara: Mp. No ratings for Rock outcrop part.	Slope, depth to rock.	Low strength, thin layer, compressible.			Slope, depth to rock.	Slope, rooting depth.
*Nacimiento: NaD, NaE, NaF, NaG.	Slope, depth to rock.	Low strength, hard to pack, thin layer.	Complex slope, percs slowly, depth to rock.	Complex slope, excess lime, percs slowly.	Complex slope, percs slowly, depth to rock.	Slope, percs slowly.
NbF, NbG. For Los Osos part of NbF and NbG, see LmF in Los Osos series. For San Benito part, see San Benito series.	Slope, depth to rock.	Low strength, hard to pack, thin layer.			Complex slope, percs slowly, depth to rock.	Slope, percs slowly.

TABLE 13.—*Water management*—Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
Narlon: NcC, NcE	Slope, seepage	Low strength, hard to pack, compressible.	Complex slope, percs slowly.	Complex slope, percs slowly, droughty.	Complex slope, rooting depth, percs slowly.	Slope, rooting depth, percs slowly.
Oceano: OaD	Slope, seepage	Seepage, piping, hard to pack.	Slope, cutbanks cave.	Complex slope, droughty, fast intake.	Complex slope, too sandy, piping.	Slope, droughty, erodes easily.
Pacheco:						
Pa	Favorable	Low strength	Wetness, excess salt.	Wetness, excess salt.	Wetness	Wetness, excess salt.
Pb	Favorable	Low strength	Favorable	Favorable	Favorable	Favorable.
Parkfield:						
PcC	Slope, depth to rock.	Low strength, compressible, thin layer.	Slope, percs slowly, depth to rock.	Slope, percs slowly, rooting depth.	Percs slowly, depth to rock.	Slope, percs slowly, rooting depth.
PcE	Slope, depth to rock.	Low strength, compressible, thin layer.	Slope, percs slowly, depth to rock.	Slope, percs slowly, rooting depth.	Percs slowly, depth to rock, slope.	Slope, percs slowly, rooting depth.
Pfeiffer:						
PdC, PdD	Slope, seepage	Seepage, piping.	Slope	Slope, fast intake, droughty.	Slope, piping	Slope, droughty.
Pe. No ratings for Rock outcrop part.	Slope, seepage	Seepage, piping.			Slope, piping	Slope, droughty.
Pico: Pf	Seepage	Piping	Favorable	Favorable	Piping	Favorable.
Pinnacles:						
PgE	Slope, depth to rock.	Low strength, thin layer, shrink-swell.	Slope, depth to rock, percs slowly.	Slope, rooting depth, percs slowly.	Slope, depth to rock, percs slowly.	Slope, rooting depth, percs slowly.
PhG2	Slope, depth to rock.	Low strength, shrink-swell, thin layer.			Slope, depth to rock, large stones.	Slope, rooting depth, percs slowly.
Pinnacles variant: PkE, PkF.	Slope	Favorable	Slope, percs slowly.	Slope, percs slowly, droughty.	Slope, percs slowly.	Slope, percs slowly, droughty.
Pits and dumps: Pm. No ratings.						
*Placentia:						
PnA	Favorable	Low strength, hard to pack, compressible.	Percs slowly	Rooting depth, percs slowly.	Rooting depth, percs slowly.	Slope, rooting depth, percs slowly.
PnC	Slope	Low strength, hard to pack, compressible.	Slope, percs slowly.	Slope, rooting depth, percs slowly.	Rooting depth, percs slowly.	Slope, rooting depth, percs slowly.
PnD, PnE, PoE. For Arbuckle part of PoE, see Arbuckle series.	Slope	Low strength, hard to pack, compressible.	Slope, percs slowly.	Slope, rooting depth, percs slowly.	Slope, rooting depth, percs slowly.	Slope, rooting depth, percs slowly.
*Plaskett: Pp. For Reliz part, see Reliz series.	Slope, depth to rock, seepage.	Piping, thin layer.			Slope, depth to rock, piping.	Slope, rooting depth.

TABLE 13.—*Water management*—Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
Psamments and Fluvents, flooded: Pr, Ps.						
Psamments part.	Seepage	Seepage, piping.	Floods, wetness, poor outlets.	Floods, wetness.	Piping, too sandy.	Droughty.
Fluvents part	Seepage	Seepage, large stones.	Floods, wetness.	Floods, wetness, droughty.	Too sandy, large stones, poor outlets.	Droughty, large stones.
Reliz	Slope, depth to rock.	Thin layer, piping.			Slope, rooting depth.	Slope, rooting depth, droughty.
Rincon:						
RaA	Favorable	Low strength, compressible, hard to pack.	Percs slowly	Percs slowly	Percs slowly	Percs slowly, complex slope.
RaC	Slope	Low strength, compressible, hard to pack.	Complex slope, percs slowly.	Percs slowly, slope.	Percs slowly	Percs slowly, complex slope.
RaD, RaE	Slope	Low strength, compressible, hard to pack.	Complex slope, percs slowly.	Percs slowly, slope.	Percs slowly, complex slope.	Percs slowly, complex slope.
Rindge: Rb	Wetness, seepage, excess humus.	Excess humus, low strength, compressible.	Wetness, floods, poor outlets.	Fast intake, seepage, wetness.	Soil blowing, wetness.	Wetness.
*Rock outcrop: Rc. No ratings for Rock outcrop. For Xerorthents part, see Xerorthents, shallow.						
Salinas:						
SaA	Seepage	Low strength, piping, hard to pack.	Favorable	Favorable	Favorable	Favorable.
SbA	Favorable	Low strength, shrink-swell, compressible.	Favorable	Favorable	Favorable	Favorable.
SbC	Slope	Low strength, shrink-swell, compressible.	Slope	Slope	Favorable	Favorable.
San Andreas: ScE, ScG.	Slope, seepage, depth to rock.	Low strength, piping, hard to pack.	Slope, depth to rock.	Slope, droughty, seepage.	Slope, piping, depth to rock.	Slope, depth to rock.
San Andreas part of GeE and GeG.	Slope, seepage, depth to rock.	Low strength, piping, hard to pack.			Slope, piping, depth to rock.	Slope, depth to rock.
San Benito:						
SdF, SdG	Slope	Low strength, compressible.	Slope, percs slowly.	Slope, slow intake, percs slowly.	Slope, percs slowly.	Slope, percs slowly.
San Benito part of NbF, NbG.	Slope	Low strength, compressible.			Slope, percs slowly.	Slope, percs slowly.
San Timoteo: SeG	Slope, depth to rock, seepage.	Seepage, piping.	Slope, depth to rock.	Slope, rooting depth, erodes easily.	Slope, erodes easily, depth to rock.	Slope, rooting depth, erodes easily.

TABLE 13.—*Water management*—Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
*Santa Lucia:						
SfD, SfE, SfF	Slope, depth to rock.	Piping, thin layer.	Complex slope, depth to rock.	Complex slope, rooting depth.	Complex slope, depth to rock, piping.	Slope, rooting depth.
Sg For Reliz and Lopez parts of Sg, see Reliz and Lopez series.	Slope, depth to rock.	Piping, thin layer.			Complex slope, depth to rock, piping.	Slope, rooting depth.
Santa Ynez:						
ShC	Slope	Low strength, shrink-swell, compressible.	Slope, percs slowly.	Slope, percs slowly, rooting depth.	Percs slowly, rooting depth.	Slope, percs slowly, rooting depth.
ShD, ShD2, ShE	Slope	Low strength, shrink-swell, compressible.	Slope, percs slowly.	Slope, percs slowly, rooting depth.	Slope, percs slowly, rooting depth.	Slope, percs slowly, rooting depth.
Shedd:						
SmG3	Slope, depth to rock.	Low strength, piping, hard to pack.	Complex slope, depth to rock.	Complex slope, excess lime, rooting depth.	Complex slope, depth to rock, piping.	Slope, rooting depth.
SnD, SnE, SnF2	Slope, depth to rock.	Low strength, compressible.	Complex slope, depth to rock.	Complex slope, excess lime, rooting depth.	Complex slope, depth to rock, piping.	Slope, rooting depth.
Sheridan: SoD, SoE, SoG.	Slope, depth to rock, seepage.	Piping	Slope, depth to rock.	Slope, fast intake, droughty.	Slope, depth to rock, piping.	Slope, rooting depth, droughty.
*Snelling: SpD, SpE2 For Greenfield part, see GmD in Greenfield series.	Slope, seepage	Low strength, shrink-swell, piping.	Slope	Slope	Piping, slope	Slope.
Sorrento:						
SrA	Favorable	Low strength, compressible.	Favorable	Favorable	Favorable	Percs slowly.
SrC	Slope	Low strength, compressible.	Slope	Slope	Favorable	Percs slowly.
*Sur: Ss, St For Junipero part of Ss and Plaskett part of St, see the Junipero and Plaskett series.	Slope, seepage, depth to rock.	Thin layer, seepage, large stones.			Slope, depth to rock, large stones.	Slope, rooting depth, large stones.
Tangair: TaC	Wetness, seepage.	Piping, seepage.	Wetness, cutbanks cave, slope.	Droughty, fast intake, wetness.	Wetness, too sandy, soil blowing.	Droughty, wetness.
Tujunga: TbB	Slope, seepage	Piping, seepage.	Slope	Slope, droughty, fast intake.	Too sandy, piping.	Droughty.
Vista: VaD, VaE, VaG, Vb. No ratings for Rock outcrop part of Vb.	Slope, seepage	Seepage, piping.	Slope, depth to rock.	Slope, droughty, fast intake.	Slope, depth to rock, piping.	Slope, droughty.

TABLE 13.—*Water management*—Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
Xererts-Xerolls complex: Xa.						
Xererts part	Slope	Low strength, compressible, hard to pack.			Slope, percs slowly.	Slope, percs slowly.
Xerolls part	Slope	Low strength			Slope, percs slowly.	Slope.
Xerorthents, sandy: Xb.	Slope, seepage	Piping			Slope	Slope.
Xerorthents, loamy: Xc.	Slope	Low strength, compressible, hard to pack.			Slope	Slope.
Xerorthents, dissected: Xd.	Slope				Slope, erodes easily.	Slope, erodes easily.
Xerorthents, shallow.	Slope	Thin layer			Depth to rock, slope.	Rooting depth, slope.

of slope, depth to bedrock or other unfavorable material, permeability, ease of establishing vegetation, and resistance to water erosion, soil blowing, soil slipping, and piping.

Grassed waterways are constructed to channel runoff to outlets at nonerosive velocities. Features that affect the use of soils for waterways are slope, permeability, erodibility, and suitability for permanent vegetation.

Formation, Morphology, and Classification of Soils

This section discusses the factors of soil formation, relates them to the formation of soils in the survey area, and explains the processes of soil formation. The system of soil classification is also explained, and the soil series in Monterey County are classified according to that system.

Formation of Soils

Soil is a natural body on the surface of the earth in which plants grow; it consists of organic and mineral matter (*26*). The characteristics of a soil at any given place are determined by the interaction of five factors of soil formation: (1) the climate under which the soil material has accumulated or weathered; (2) the forces of plants and animals; (3) the relief, or topography; (4) physical and chemical properties of the parent material; and (5) the length of time these factors or processes have been working. Each of these factors affects the formation of every soil, and each modifies the effects of the other four. The importance of the individual factors differs from place to place.

Climate and plants and animals are the active forces of soil formation. They act on the parent material that has accumulated through the weathering of rocks and slowly change it into soil. Topography modifies the effects of climate and vegetation, mainly by its influence on runoff and temperature. The nature of the parent material also affects the kind of soil that is formed. Time is needed to change the parent material into soil, and a long time generally is needed for the formation of distinct soil horizons.

The interactions of these factors are more complex for some soils than for others. For example, the environment has changed in places, and the characteristics of a new soil have been superimposed on those of an older soil. In Monterey County, Salinas soils apparently represent a response to environmental changes. Salinas soils seem to have formed during a time when water was at or near the surface and the vegetation was probably sedges, tules, or other vegetation adapted to wet conditions. Salinas soils in their present environment are well drained and have grass vegetation or are continuously cultivated.

In the pages that follow, the five major factors of soil formation are discussed in relation to their effects on the formation of soils in Monterey County.

Climate

The climate, or the amount and distribution of heat and moisture received, has a marked influence on the kind of soils that form. Heat and moisture strongly influence the amount and kind of vegetation, the rate at which organic matter decomposes, the rate at which minerals weather, and the removal or accumulation of material in the different soil horizons.

There are several different climatic regions in the county, although the transition between the regions is gradual. These regions are the coastal areas and valleys that open to the coast; interior valleys generally

surrounded by foothills or mountains, as in the Jolon-Lockwood area; the foothills, like the area east of King City and Bradley; and the higher more rugged mountainous areas of the Santa Lucia and the Gabilan Ranges.

The mean annual temperature ranges only from 55° to 59° F. However, there is a great difference between the maximum and minimum temperatures from one region to another. The mean maximum temperature averages about 100° F near Jolon in the interior, but only about 79° on the Monterey Peninsula. The mean minimum temperature for Jolon is about 30° and for the Peninsula, about 41°. Generally, the summers are hot and dry, except along the coast, and the winters are cool and moist. Most of the precipitation falls from November through April. Annual rainfall ranges from a low of about 10 inches from Soledad to Bradley to a high of more than 76 inches at Cold Springs in the mountains about 6 air miles northeast of Big Sur. In the mountains, snowfall occurs in most years, but the seasonal average is less than 5 inches. The higher peaks, however, average about 20 inches, and depths to 30 inches are not uncommon (fig. 13). Detailed climatic data for the county is given in the section "Environmental Factors Affecting Soil Use."

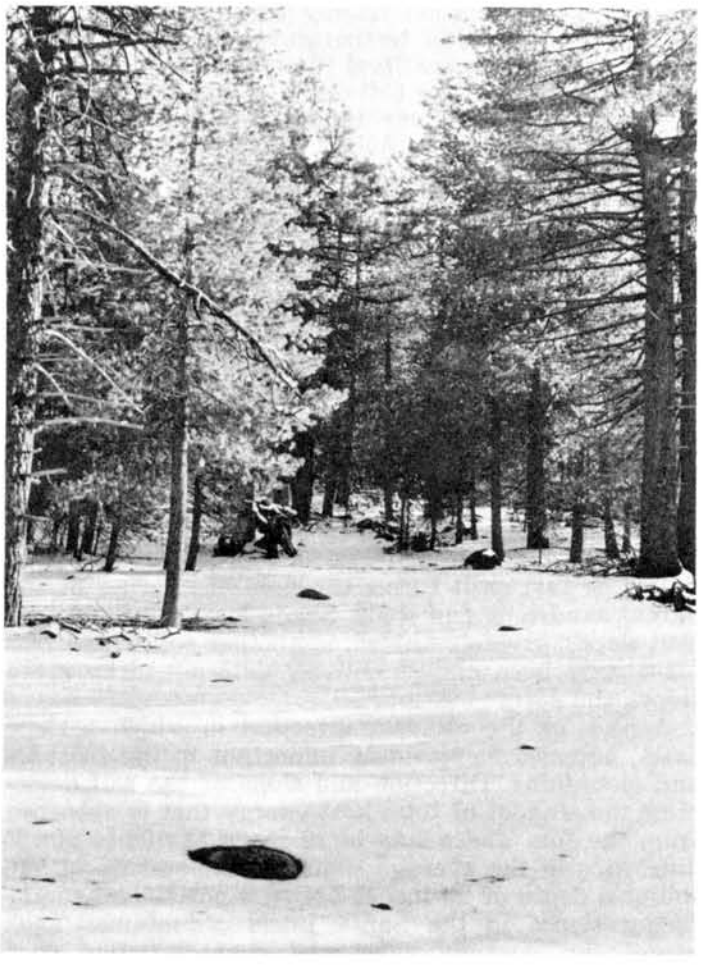

Figure 13.—**Snow cover on Junipero Serra Peak ranges from a few inches to 3 feet deep and remains as long as 2 months.**

Areas along the immediate coast and the valleys that open toward the ocean have much fog in summer and generally lower temperatures. In foggy areas, humidity is higher, transpiration rates are lower, and ground water is conserved more readily. Low summer temperatures, fairly high humidity, fog, and modest levels of rainfall combine to produce soils that are commonly gray, dark gray, grayish brown, or dark brownish gray. In the interior valleys and in most of the foothills, plant growth, mainly grasses and forbs, is rapid in the spring but ceases rather abruptly with the onset of hot weather in May and June. The soils also become dry during these months. The oxidation of the organic matter during the hot summers and short growth period permits little accumulation of organic matter.

In the higher foothill areas and in the mountains, the effects of the higher precipitation and lower temperatures are evident in the vegetation and soils. Woody and herbaceous vegetation is more abundant and the organic-matter content of the soils increases. Laboratory tests indicate as much as 4 to 6 percent organic carbon content in the surface layer. These soils commonly are dark colored and have a granular surface layer underlying a layer of leaves, twigs, and partly decomposed matter.

In many places, rainfall is sufficient to leach bases from the soils and lower the soil reaction. These soils are commonly slightly acid to very strongly acid.

Warm temperatures in spring, while the soils are moist, increase the rate of soil formation. The warm temperatures increase the rate of chemical reactions, and percolating water from spring rains leach out soluble materials and relocate suspended materials in the soil. The remains of plants decompose rapidly and the organic acids that are produced hasten the formation and movement of clay. Soil forming processes in the county are cyclic. Weathering is relatively rapid in spring and early summer and slow in fall.

Generally, weathering and soil formation is more rapid in the cool, moist coastal zone. Soil forms at intermediate rates in the warmer, drier interior valleys, and at the slowest rates in the colder climates of the higher elevations. Thus, climate has had a strong influence on the formation of most soils in the county, but climate alone does not account for all the local differences among the soils.

Plants and animals

Plants, animals, insects, bacteria, and fungi are biotic forces in soil formation. They are responsible for gains in organic-matter content and nitrogen, gains or losses in plant nutrients, changes in structure and porosity, and mixing of developing soil horizons. Plants have more influence than animals on the formation of soils in Monterey County.

Much of the county is dominated by oak-grass vegetation. The native perennials have mostly been replaced by annual grasses and forbs. In some places oaks are very sparse and grow only on the north-facing slopes or along drainageways. In other places oaks are scattered or grow in open, park-like stands. The dominant oaks are live oak (Quercus agrifolia), valley white oak (Quercus lobata), blue oak (Quercus

douglasii), and scrub oak (Quercus dumosa). On higher, more moist sites, the oaks are mostly black oak (Quercus kelloggii), canyon live oak (Quercus chrysolepis), interior live oak (Quercus wislizensii), and tanoak (Lithocarpus densiflora). The scrub form of these last three varieties is also abundant on the shallower soils of the higher areas.

Areas of brush and chaparral are common and very extensive on the Santa Lucia, Reliz, and Lopez soils. The main species are chamise (Adenastoma fasciculatum), manzanita (Arctostaphylos spp.) and ceanothus (Ceanothus spp.).

The dominant vegetation on the Monterey Peninsula is Monterey pine (Pinus radiata) and patches of Monterey cypress (Cupressus macroparpa). Where an understory occurs, it is composed mostly of manzanita (Arctostaphylos spp.), huckleberry (Vaccinium spp.), ceanothus (Ceanothus spp.), oregongrape, or California barberry (Berberis spp.), and annual grasses and sedges.

In the Santa Lucia Mountains in the fog belt along the coast, the vegetation consists of coastal chaparral, cypress (Cupressus macroparpa), laurel (Umbellularia californica), coast redwood (Sequoia sempervirens), and madrone (Arbutus spp.). In the interior canyons and above the fog belt, yellow pine (Pinus ponderosa) and Douglas-fir (Pseudotsuga menziesii) also occur. The north-facing slopes and canyons commonly have tree cover, but the drier, south-facing slopes are covered by grasses, brush, or chaparral. The soils on the southern slopes are shallow and more droughty.

Where organic matter from plants accumulates, a mat forms on the surface from less than an inch to more than 6 inches thick. In some places the mat and the underlying 5 to 10 inches of mineral soil have been churned up by the rooting of wild hogs. The mat consists of fresh and somewhat decomposed needles, leaves, and twigs and is acid in reaction. The acid reaction of the mat contributes to the acid reaction of the underlying mineral soil. In addition, plant roots follow cracks and fracture planes in the parent rock and contribute to the physical and chemical weathering processes of soil formation. Roots also retard erosion and thereby facilitate the accumulation of mantles of rock debris.

In places roots occupy more than 20 percent of the upper 2 or 3 feet of the soil, especially near trees. Growth and decomposition of roots tend to make the soils more porous and contribute to organic matter content. The carbon-nitrogen ratio of these soils commonly exceeds 20. In some wooded areas, shrubs are intermingled with coniferous trees. Shrubs commonly grow on shallow soils, or they represent a stage in plant succession following burning or clearing. Ultimately they disappear after the tree canopy has been reestablished.

Man has directly or indirectly disturbed the soils in the area by mining, clearing or burning the vegetation, harvesting timber, grazing livestock, and cultivating the soils. Burning has probably influenced the soils the most, since repeated fires deplete organic matter, cause erosion, and change the plant ecology. Following a fire, different plant communities are established and one of the soil-forming factors is altered. Man and lightning are the main causes of fires.

The effect of animals on soils in the county is less apparent. No distinct or major soil features are attributed solely to animal activity. Ground squirrels and pocket gophers prefer to burrow and nest in calcareous soils, and the calcareous Linne and Shedd soils have two to ten times more burrows than neighboring soils. The horizons of these soils are weakly expressed. These soils are soft and calcareous throughout, features inherited from the parent material, and small pieces of soft shale are common throughout the profile. A large volume of soil material is brought to the surface each year, and many burrows collapse. The similarity of horizons and weak profile development in these soils may be related to animal activity. In some areas, animal burrows have contributed to the concentration of runoff water into channels that eventually develop into severe gullies.

Topography

Topography, or the shape of the landscape, affects soil formation through its influence on climate, drainage, erosion, plant cover, and soil temperature.

Elevation, slope, and position of the soil on the landscape are all functions of topography. Elevation influences soil formation mainly through its effect on precipitation and soil temperature. Elevations in the county range from sea level to about 6,000 feet. Slope and the position of the soil on the landscape affect soil formation through their influence on the movement and retention of water. Aspect greatly affects local climate which, in turn, influences vegetation and other soil-forming processes.

Soils that have very steep slopes generally have rapid runoff. Material is rapidly eroded from the surface, and only a small amount of percolation water is available for leaching and weathering. Plants grow slowly, and the effect of plants and animals on the soils is slight. In general, steeper soils are shallow and less leached and soil formation is weakly expressed. Very steep soils erode rapidly, are considered young even if the parent material is old, and strongly reflect the features of the parent material. For example, the Reliz soils are only 10 to 20 inches deep, the organic surface layer is very thin, and little or no clay has accumulated in the subsoil. Soil material is lost through erosion nearly as fast as it forms through weathering of the parent sandstone and shale. Shedd loam, 30 to 75 percent slopes, severely eroded, is another soil whose features have been almost entirely determined by steep slopes and severe erosion.

Aspect, or the compass direction in which a slope faces, becomes increasingly important in the foothills and mountains. Direction and slope of the soil determine the amount of total heat energy that is absorbed from the sun. There may be as much as 10° to 30° F difference in the average summer temperature of the soil at a depth of 20 inches between north- and south-facing slopes in the Santa Lucia Mountains. Thus aspect can strongly affect soil characteristics at a higher elevation or on different sides of prominent mountains or ridges. Examples are Junipero or Plas-

Figure 14.—The redwoods, conifers, and hardwoods on north slopes are in the Gamboa-Sur complex. The brush covered south slopes are in the Cieneba-Rock outcrop complex and the Rock outcrop-Xerorthents association. This area looking south down the Big Sur River near Pfeiffer State Park is used for recreation.

kett soils on north-facing slopes and Cieneba or Reliz soils on south-facing slopes (fig. 14).

Where soils are very gently sloping or level, little rainfall is lost by runoff, and runoff from higher soils may flow onto these soils. Little soil material is lost through erosion, alluvium may be deposited, and if level soils are permeable and well drained, relatively large amounts of percolation water may leach through the soil. Where level soils are not excessively drained or leached and are moist for long periods, grass and grasslike plants grow abundantly. The surface layer is commonly dark gray and has a high organic-matter content. In other soils with a high water table, the subsoil is mottled with light gray or bluish colors caused by reduced iron.

In wet soils clay movement from the surface horizon into subsoil horizons is minimal because little water can move downward. Alviso soils are an example. Soils such as Clear Lake and Pacheco soils formed in nearly level and depressional areas where water stands or drains away slowly. These soils are saturated for long periods and are poorly aerated unless artificially drained. They are mottled with gray because of the reduction and transfer of iron.

Some organic soils formed in old lake depressions or sloughs consisting of decomposed tules, rushes, and reeds. Rindge soils commonly occur in these areas.

Parent material[7]

Several characteristics of the parent material

[7] KENNETH R. LAJOIE and JOHN C. TINSLEY III, U.S. Geological Survey at Menlo Park, helped review this section.

strongly affect the kind of soil that is formed. These are mineralogical composition, hardness and degree of consolidation, grain size, and amount of salts. The age of the parent material is generally of secondary importance. Parent materials in Monterey County are related mostly to the composition of the geologic formations.

Monterey County covers many geologic formations of igneous, sedimentary, and metamorphic origin. The formations differ greatly in age, hardness, and resistance to weathering. These lithologic differences significantly affect the landscape as well as the characteristics of the soils.

An analysis of representative soils that formed in various geologic formations is presented in table 8.

The oldest exposed rocks in Monterey County are shale, sandstone, and limestone of the Sur rock series. These rocks were deposited 300 to 400 million years ago, during the Palezoic era, hundreds of miles south of their present location.

The metamorphosed Sur Series rocks, a geologic formation not to be confused with Sur soils, consist of schist, gneiss, quartzite seams, crystalline limestone and dolomite, and several contact metamorphic rocks (*25*). These occur mostly in the Santa Lucia and Sierra de Salinas Ranges, where the landscape commonly is very steep, deep canyons. In places, rock fragments dominate the profile. Most of the rocks are crystalline, and generally the soils derived from them are loams and sandy loams such as the Junipero, McMullin, Plaskett, and Sur soils. These soils are commonly on steep north slopes under trees. Gamboa soils are commonly on the toe slopes near the canyon bottoms under dense stands of redwood, pine, fir, and madrone. Mostly Cieneba soils are on the steep southern slopes under a brush canopy. Pfeiffer, Sheridan, and Vista soils are the dominant soils under grass or grass and oak on open ridges.

Granitic rocks intrude the Sur Series rocks. The Gabilan Range is made up almost entirely of granite, and other areas of granite occur throughout the Santa Lucia Range. These rocks range in composition from granite to granodiorite, quartz monzonite, and quartz diorite. Some porphyritic rocks are also included. The soils that were derived from granitic rocks are similar to those that were derived from Sur Series rocks. The dominant soils are Cieneba, Sheridan, McCoy, and Vista soils. McCoy soils are mostly sandy clay loam.

Masses of limestone and dolomite are scattered throughout the mountain ranges, but no separately identifiable soil has weathered from these rocks. Commonly these rocks form prominent topographic features such as Pico Blanco near Big Sur and Fremont Peak in the northeastern part of the county.

The Franciscan Formation owes its distinctive physical and chemical traits to geologic processes, such as plate convergence and subduction, which are associated with sea-floor spreading and continental drift. A trench and subduction zone is inferred to have existed off the west coast of North America some 90 to 150 million years ago. The rapid lateral and vertical changes in rock type so characteristic of the Franciscan Formation in Monterey County result from these rocks having been carried into and beneath the western edge of North America and severely disrupted, sheared, and metamorphosed to various degrees in the process. Subsequent uplift has exposed these rocks to geologic scrutiny and interpretation. The Franciscan rocks are viewed as a patchwork of sandstone bodies mixed with chert, basalt, diabase, some serpentine, and other ultramafic rocks.

The Franciscan Formation consists of sandstone, graywacke, dark or black shale, rhythmically interbedded radiolarian red cherts and shales, some volcanic flows, and greenstone (*6*). Depending somewhat on the rock type and degree of metamorphism, various kinds of soils have formed. Gazos, McMullin, Millsholm, Plaskett, and Gamboa soils occur on the sandstone and shale. Gilroy and Los Gatos soils and the McCoy very stony subsoil variant commonly occur on the more metamorphosed sandstone, shale, chert, and basic igneous rocks. Slides, rock outcrops, and small soil flows are fairly common in this formation. The Franciscan Formation is intruded by ultrabasic rock mostly altered to serpentine. The Climara, Henneke, and Montara soils formed in parent materials that were derived from serpentinite and similar rock. With the exception of Climara soils, these soils are less fertile than those that were derived from sedimentary rocks because ultrabasic rocks contain large amounts of magnesium in proportion to calcium. Excess magnesium seriously reduces the amount of calcium taken up by plants.

Sometime during the Cretaceous Period, large-scale, right-lateral faulting began along the west coast of North America. All the rocks described, which were formed hundreds of miles south of their present location, began moving northward. The large-scale displacements took place along numerous northwest-southeast trending faults that run the length of the coast of south-central California. The successively older Tertiary rocks moved northward correspondingly greater distances. Many of the faults are now inactive, but the right-lateral displacement continues on the San Andreas Fault at an average yearly rate of about 4 to 6 centimeters.

The Cretaceous rocks are divided into Early and Late Cretaceous Formations. Only a very minor area of the Early Cretaceous rocks is exposed. The Late Cretaceous rocks are exposed in large areas near the southwestern part of the county and along the eastern edge near the San Andreas Fault. The rocks are hard and soft sandstone and shale, and the soils that were derived from this formation vary considerably depending on the type of rock. Gaviota soils formed in material that was derived from hard sandstone, and Alo, Dibble, Los Osos, and San Andreas soils in material that was derived from soft sandstone. Gazos and Millsholm soils formed mostly in material that was derived from shale.

Formations laid down during the Paleocene, Eocene, and Oligocene Epochs are exposed in only a few areas in the county (fig. 15). These are referred to as the Reliz Canyon and Church Creek Formations, and the Rocks Sandstone (*12, 13*). The rocks in these formations are mainly sandstone, shale, and some conglomerate. The soils that were derived from these rocks are similar to those that were derived from the Cre-

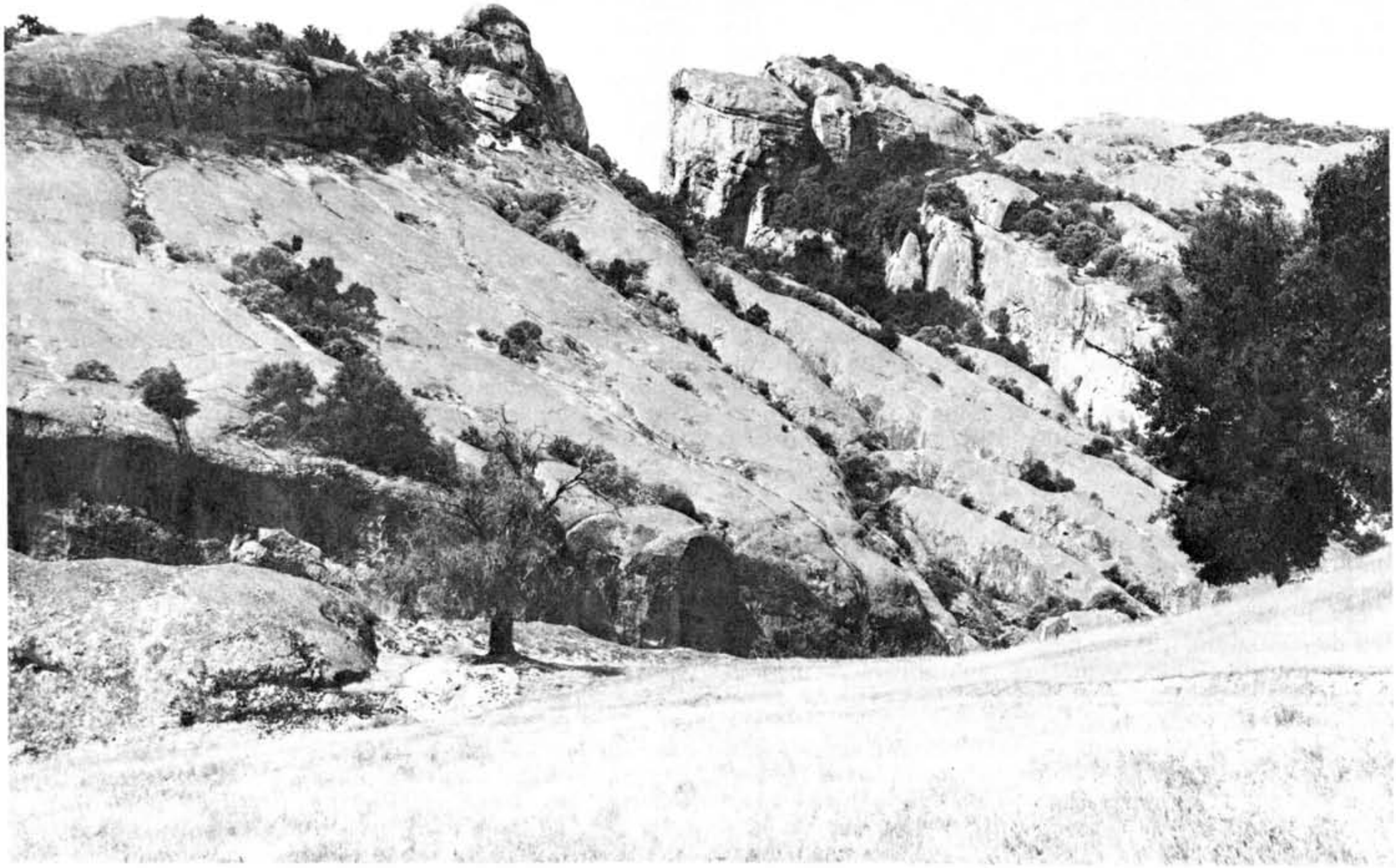

Figure 15.—**Massive sandstone formations laid down during the Paleocene, Eocene, and Oligocene Epochs are exposed in the upper part of Reliz Canyon in an area of Rock outcrop-Xerorthents association known as "The Rocks."**

taecous rocks. Gaviota soils are probably the most common. Some of the soils that were derived from Larkosic or very coarse sandstone are similar to those that were derived from the Sur Series rocks and from granite that characteristically includes massive sandstone outcrops and very little or no soil.

Miocene rock outcrops occur in large areas of the county. Several formations have been recognized (*8, 13, 14, 15, 17*) including the Vaqueros (Oligocene or early Miocene), Sandholdt or Temblor (early and middle Miocene), Monterey (middle and late Miocene), and Santa Margarita, San Pablo, McClure Shale, or unnamed sandstone, mudstone, and shale (late Miocene).

The Vaqueros Formation is mostly arkosic sandstone. Gaviota soils generally form where the rock is coarse grained and noncalcareous. Alo, Diablo, Los Osos, and Millsholm soils form where the rock is calcareous or fine grained. Rock outcrops are common.

The Sandholdt Formation is mainly fine and medium grained calcareous sandstone and shale. There is an abundance of calcium carbonate, and the calcareous Nacimiento, Ayar, Shedd, and Linne soils formed.

Intense volcanism occurred at least during the middle Miocene Epoch, and volcanic ash fell into large shallow seas. One source of the ash was probably the Pinnacles in the eastern part of the county. The volcanic ash, and possibly mineral springs on the sea floors, supplied the parent material for siliceous shale of the Monterey Formation. The environment was very favorable for microscopic plants and diatoms, whose remains left deposits as much as 9,000 feet thick.

The middle Miocene or Monterey Formation covers more than 300,000 acres, mostly from the Monterey Peninsula south to the county boundary. The rocks are dominantly porcelaneous or clastic mudstone and shale that contain varying amounts of diatoms. The rocks vary considerably in consolidation, or hardness, and they are very light gray to white or shades of yellow or brown. The soils that were derived from these rocks are generally gray, dark gray, or grayish brown. They are granular, permeable, have little or no clay accumulation in the subsoil, and, if formed over hard siliceous shale, are commonly less than 20 inches deep.

Gazos soils formed from material that was derived from soft shale low in diatom skeletons. Santa Lucia, Lopez, and Reliz soils were derived from medium to hard, brittle shale in which the siliceous deposits are

somewhat cemented. The Chamise and Lockwood soils formed from alluvium that was derived mainly from porcelaneous and clastic mudstone and shale. They have a grayish surface layer similar to that of the residual soils that formed from this parent material.

During the late Miocene Epoch, the Santa Margarita Formation resulted from a cycle of erosion that deposited additional sediment from the Sur Series rocks and granite on the siliceous shale. Sandstone dominates the late Miocene formations. Alo, Los Osos, and Millsholm soils formed from material that was derived from these nondiatomaceous rocks.

During the Pliocene Epoch, the region was above sea level for the last time, and the Monterey and other formations were eroded. Thick beds of very fine sand, silt, and clay accumulated in a shallow sea trough mostly between the Salinas River and the San Andreas Fault, south of Greenfield.

The dissected plateau east of King City, known as the Gabilan Mesa, is mainly Pliocene rocks of the Pancho Rico Formation. These rocks generally are soft, calcareous sandstone, shale, and siltstone. Soils from these rocks are dominantly gray, dark gray, and grayish brown, are high in silt and clay, and are commonly calcareous throughout the profile. Examples are Shedd, Linne, Nacimiento, and San Benito soils.

The youngest rocks are in the Paso Robles Formation deposited during the late Pliocene and early Pleistocene Epochs. This formation is highly stratified in places and is derived from debris and sediment from the Sur Series rocks, granite, and siliceous shale of the Monterey Formation. The largest area is south of San Ardo, another is in the Jolon-Lockwood-Hames Valley area, and a third occurs along State Highway 68 near San Benancio Canyon. The Paso Robles Formation consists of conglomerate, sandstone, and mudstone. Much of the formation is calcareous and commonly has interbedded gravel. Depending on the strata exposed by erosion, many different kinds of soils occur on this formation, including Nacimiento, Shedd, Linne, Los Osos, San Benito, Diablo, Alo, and Chamise soils.

Several marine benches and wave-cut terraces were formed as a result of fluctuations of the sea level. As many as four terrace levels occur around the Monterey Peninsula and south along State Highway 1. During the middle and late Pleistocene Epoch, large areas of sandy deposits were exposed near the mouth of the Salinas Valley. The Aromas Red Sands were deposited by wind and waves and produced a low-lying complex of sand bars, dunes, and lagoonal deposits. These sands were uplifted without significant deformation and were weakly to strongly cemented by reprecipitation of hematite and the oxidation and solution of magnetite. Oxidation of the iron-bearing minerals gives them their characteristic red color.

The unconsolidated deposits from the Pleistocene Epoch to the present consists of several landforms. The oldest is the Aromas Red Sands in the northern part of the county (*1*). This formation generally is weakly consolidated but in places it is indurated and has prominent escarpments where the indurated layer is exposed. Some soils that formed from the Aromas sands are Arnold, Elkhorn, and San Andreas soils and the Elkhorn variant. More recent sand dunes (*11*) have blown inland in the vicinity of Marina, Fort Ord, and Pacific Grove. The Baywood, Garey, and Oceano soils developed in these dunes. Most of the Garey soils are south of King City on the stabilized dunes. These dunes are accumulations of sands from the Salinas River that are deposited by wind blowing southward through the Salinas Valley. Some recent dunes are so unstable that soil formation has not begun, and these mostly occur along Monterey Bay and the Monterey Peninsula.

Terrace deposits generally are moderately coarse textured and medium textured. Some are gravelly or very gravelly. The direct effect of terrace deposits on soil formation is difficult to determine because most of the deposits are mixtures of several source materials. Because soil-forming processes have materially altered the parent materials, the contribution of any one kind of material is obscure. Some soils that formed from terrace deposits are Chualar, Chamise, Placentia, Gloria, Pinnacles, Santa Ynez, Narlon, Antioch, and Parkfield soils.

Slightly folded and faulted Pleistocene deposits and marine terraces indicate that several of the faults in Monterey County have been fairly active recently and may still be active. Abrupt changes in landscape and rock type are likely to be associated with these and older inactive faults.

The youngest geologic materials are recent alluvium of sand, silt, and clay on flood plains and in broad valley fills that predominate along the length of the major valleys, such as the Salinas and Carmel Valleys. Although inherited clay mineralogy has some effect on soil formation, texture and thickness of the deposits are generally the most important factors. Living organisms and weathering have had little time to affect the soils, most of which are classified according to their drainage, texture, and reaction. The soil features are largely dependent on the sequence in which the parent materials were deposited. Some of the soils that formed from alluvium are Alviso, Arroyo Seco, Clear Lake, Cropley, Docas, Gorgonio, Metz, Mocho, Pacheco, Pico, Rincon, Salinas, and Tujunga soils.

Time

All soil-forming factors are interrelated, and soil properties are dependent on the length of time these factors have been interacting. The oldest geologic formations are probably of Late Paleozoic age (*17*). However, these formations have some of the youngest soils. Where the slopes are very steep or steep and where geologic erosion and soil creep equalizes soil formation and weathering of the parent material, soil formation and erosion may proceed simultaneously. In the older formations, soil formation and geologic erosion may be in balance, resulting in downward development of the profile as the surface is removed. The oldest soils are on dissected alluvial terraces, fan deposits, and on the Paso Robles Formation, although these are relatively young formations ranging from Holocene to Early Pleistocene or Late Pliocene in age.

The oldest soils generally are those in which the parent material has been most altered. Soils are considered to be old if their horizons are distinctly different in color, texture, reaction, structure, or other properties. Generally, distinct boundaries between

horizons characterize older soils. Soils having few or indistinct horizon differences are considered to be intermediate in age. Soils having few or no horizon differences are considered to be young. Differences between horizons or layers resulting from sequential deposition of contrasting materials are not considered in evaluating the age of a soil. Also, soils having the greatest horizon differences are not necessarily the oldest if, for example, the parent material is easily weathered. In some soils, the dominant influence of some other factor, such as highly resistant parent material or a high water table, may largely determine the features of the soil.

Young soils are generally those that have little or no alteration of parent material or formation of distinct horizons. The young soils can be separated into three groups. One group consists of soils that formed in stabilized sand dunes, such as Oceano and Baywood soils, and those that formed on recent flood plains and fans, such as Tujunga and Metz soils. Another group consists of soils that formed on somewhat older flood plains, such as Mocho, Salinas, and Docas soils. The Oceano and Tujunga soils have had very little time for accumulation of organic matter. The Mocho and Salinas soils have had time for accumulations of organic matter and subsequent darkening of the surface horizon. Another group of young soils formed on hard rock in some upland or mountainous areas where soil material is eroded as rapidly as it weathers from the parent material. Gaviota soils are in this group.

Somewhat older soils have undergone changes other than the addition of organic matter and the loss or gain of some bases. In addition to clay formation by weathering of minerals in the subsoil, clay has been leached from the surface layer and accumulated in the subsoil. These soils are represented by Chualar, Elkhorn, Los Osos, and Placentia soils, which formed in old alluvial deposits. As clay accumulated in the subsoil, pore size and volume decreased and permeability was reduced. The differences between the surface layer and subsoil became greater, and the horizon boundaries became more distinct.

The Gloria soils are classified as Durixeralfs and represent some of the oldest soils in the county. The formation of hard, massive, cemented layers and duripans (very hard indurated horizons) is generally associated with very mature soils. The indurated layer generally is 20 to 40 inches below the surface. In some places it is exposed at the surface or occurs as ledges on terrace escarpments. It consists of layers of soil cemented with silica, and it presents a massive barrier to root and water penetration.

Morphology of Soils

The formation of soils involves a process consisting of two steps: the accumulation of parent materials and the differentiation of horizons in the profile (*4, 9, 18, 23*). Because these steps are not clear cut but merge and overlap, it is difficult to identify the beginning or ending of any one process.

Horizon differentiation in soils is considered to result from four basic kinds of changes: additions (gains), removals (losses), transfers (translocations), and transformations. These four processes of horizon differentiation are interacting in the formation of most soils, but their relative importance is not uniform for all soils. It is possible that they change with time for a single profile. All processes do not necessarily enhance or start horizon differentiation, and in some cases may inhibit it. For example, some clays crack extensively upon drying. Soil material falls into the cracks and subsequently swells upon wetting. This swelling churns the whole soil to the depth of the cracks, thus eliminating the probability of the formation of major horizons in the cracking zone. Clear Lake and Cropley soils are examples. Some soils are distributed by animals. In others the uptake of nutrients by plants from subsoil horizons inhibits horizon formation.

Many properties of a soil are products of additions, removals, translocations, or transformations of organic matter, bases, soluble salts, carbonates, sesquioxides, or silicate clay minerals. Organic matter is added to the surface, transformed into humus by decay, and translocated to another horizon or out of the profile. Gradual removal of bases is commonly accompanied by increasing acidity. Bases may be moved by plants from one horizon to another or recycled from lower horizons to the surface. Silicate clays may be formed from primary minerals and accumulate in place or be translocated from upper to lower horizons. All these processes or changes affect horizon formation. The sequence and kinds of horizons are diagnostic for recognition and placement of soils into a system of classification.

In Monterey County accumulation of organic matter and the presence of bases is reflected by dark colored surface layers called mollic epipedons. The presence or absence of only a small amount of organic matter generally results in light colored surface horizons that are massive and hard, called ochric epidedons. Argillic horizons formed by the weathering of primary minerals to silicate clays and the subsequent translocation and accumulation of clay in the lower horizons. Further evidence of the argillic horizon is the presence of clay films in pores and on peds. In some places in the county, the parent material had relatively high amounts of carbonates. Carbonates inhibit weathering of silicate minerals, and if they are not removed by leaching, only slight weathering occurs.

Some examples of the processes of horizon differentiation are evidenced in the Salinas soils. Organic matter has accumulated to form a thick, dark surface, and some leaching has translocated carbonates to subsoil horizons. The processes were similar in the Junipero soils, but some bases, rather than carbonates, were removed from the surface layer. This resulted in increased acidity in the surface horizons. Linne, San Benito, and Shedd soils are representative of soils that have calcareous parent materials. They occur in an area of low rainfall and as a result, are only slightly leached. These soils have no clay accumulations or argillic horizons. Narlon soils have been strongly leached and weathered. They are strongly or very strongly acid and have thick, light colored, leached albic horizons and thick argillic horizons.

Addition of organic matter, leaching of bases and carbonates, and translocation of silicate clays are

among the more important processes of horizon differentiation in the soils of Monterey County.

Classification of Soils

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Readers interested in further details about the system should refer to the latest literature available (*29*).

The system of classification has six categories. Beginning with the broadest, these categories are order, suborder, great group, subgroup, family, and series. In this system the bases for classification are the different soil properties that can be observed in the field or those that can be inferred either from other properties that are observable in the field or from the combined data of soil science and other disciplines. The properties selected for the higher categories are the result of soil genesis or of factors that affect soil genesis. In table 14 the soils of the survey area are classified according to the system. Classes of the system are briefly discussed in the following paragraphs.

ORDER. Ten soil orders are recognized but only seven occur in Monterey County. The properties used to differentiate among orders are those that reflect the kind and degree of dominant soil-forming processes that have taken place. Each order is identified by a word ending in *sol.* An example is Mollisol.

Alfisols have a B horizon that shows evidence of clay illuviation. They are commonly light colored and have a base saturation of more than 35 percent. The base saturation normally increases with increasing depth. Gloria and Placentia soils are typical Alfisols.

Entisols are young mineral soils that do not have genetic horizons or have only the beginning of such horizons. Metz and Shedd soils are typical Entisols.

Histosols are soils that consist mostly of organic material. They commonly are saturated with water most of the year unless drained. Rindge soil is the only Histosol in the county.

Inceptisols are mineral soils in which definite horizons have started to develop. They have one or more diagnostic horizons that do not show evidence of significant illuviation, eluviation, or extreme weathering. Millsholm and Vista soils are representative of Inceptisols in the county.

Mollisols have a dark colored, friable surface layer and have more than 50 percent base saturation. Salinas and Sheridan soils are typical Mollisols.

Ultisols are soils that have a clay-enriched B horizon and have less than 35 percent base saturation. The base saturation decreases with increasing depth. Haire and Narlon soils are the two Ultisols in the county.

Vertisols are clayey soils that crack, shrink, and swell in all seasons and that have deep, wide cracks during dry periods. Clear Lake and Diablo soils are typical Vertisols.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Xeroll (*Xer,* meaning moist in winter and dry in summer, reflecting a Mediterranean type climate, plus *oll,* from Mollisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of expression of pedogenic horizons; soil moisture and temperature regimes; and base status. The name of a great group ends with the name of a suborder. A prefix added to the name suggests something about the properties of the soil. An example is Haploxerolls (*Haplo,* meaning simple horizons, *xer,* for moist in winter and dry in summer, and *oll,* from Mollisol).

SUBGROUP. Each great group is divided into three subgroups: the central (typic) concept of the great groups, which is not necessarily the most extensive subgroup; the intergrades, or transitional forms to other orders, suborders, or great groups; and the extragrades that have some properties that are representative of the great groups but do not indicate transitions to any other known kind of soil. The names of subgroups are derived by placing one or more adjectives before the name of the great group. The adjective *Typic* is used for the subgroup that is thought to typify the great group. An example is Typic Haploxerolls.

FAMILY. Families are established within a subgroup on the basis of similar physical and chemical properties that affect management. Among the properties considered in horizons of major biological activity below plow depth are particle-size distribution, mineral content, temperature regime, thickness of the soil penetrable by roots, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup and a series of adjectives. The adjectives are the class names for the soil properties used to differentiate families. An example is the coarse-loamy, mixed, thermic family of Typic Haploxerolls.

SERIES. The series consists of a group of soils that formed in a particular kind of parent material and have horizons that, except for texture of the surface soil, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineralogical and chemical composition.

Laboratory Analysis

The results of some physical and chemical analyses of representative soils of the county are given in tables 15 and 16. The data are for selected soils of nine soil series that are extensive in the county. They are based on the profile described as representative of the series in the section "Soil Maps for Detailed Planning."

The soil samples were air dried and crushed by hand so that the material would pass through a 2-millimeter, round-hole sieve. Fragments larger than 3 inches were estimated by volume in the field. The fragments between 3 inches and ¾ inch in diameter were weighed in the field. The gravel and stones larger than 2-millimeters in diameter were reported as a weight percentage of the total sample. Most determinations,

TABLE 14.—*Classification of the soils*

Soil name	Family or higher taxonomic class
Alo	Fine, montmorillonitic, thermic Typic Chromoxererts.
Alviso	Fine, mixed, nonacid, isomesic Tropic Fluvaquents.
Antioch	Fine, montmorillonitic, thermic Typic Natrixeralfs.
Aquic Xerofluvents	Aquic Xerofluvents.
Arbuckle	Fine-loamy, mixed, thermic Typic Haploxeralfs.
Arnold	Mixed, thermic Typic Xeropsamments.
Arroyo Seco	Coarse-loamy, mixed, thermic Fluventic Haploxerolls.
Ayar	Fine, montmorillonitic, thermic Typic Chromoxererts.
Baywood	Sandy, mixed, thermic Entic Haploxerolls.
Chamise	Clayey-skeletal, mixed, thermic Ultic Argixerolls.
Chualar	Fine-loamy, mixed, thermic Typic Argixerolls.
Cieneba	Loamy, mixed, nonacid, thermic, shallow Typic Xerorthents.
Clear Lake [1]	Fine, montmorillonitic, thermic Typic Pelloxererts.
Climara	Fine, montmorillonitic, thermic Chromic Pelloxererts.
Cropley	Fine, montmorillonitic, thermic Chromic Pelloxererts.
Danville	Fine, montmorillonitic, thermic Pachic Argixerolls.
Diablo	Fine, montmorillonitic, thermic Chromic Pelloxererts.
Dibble [2]	Fine, montmorillonitic, thermic Typic Haploxeralfs.
Docas	Fine-silty, mixed (calcareous), thermic Typic Xerofluvents.
Elder	Coarse-loamy, mixed, thermic Cumulic Haploxerolls.
Elkhorn	Fine-loamy, mixed, thermic Pachic Argixerolls.
Elkhorn variant	Fine-loamy, mixed, thermic Typic Argixerolls.
Fluvents, stony	Fluvents.
Fluvents, flooded	Fluvents.
Gamboa	Loamy-skeletal, mixed, mesic Pachic Haploxerolls.
Garey	Coarse-loamy, mixed, thermic Psammentic Haploxeralfs.
Gaviota	Loamy, mixed, nonacid, thermic Lithic Xerorthents.
Gazos	Fine-loamy, mixed, thermic Pachic Haploxerolls.
Gilroy	Fine-loamy, mixed, thermic Typic Argixerolls.
Gloria	Fine, illitic, thermic Abruptic Durixeralfs.
Gorgonio	Sandy, mixed, thermic Fluventic Haploxerolls.
Greenfield	Coarse-loamy, mixed, thermic Typic Haploxeralfs.
Haire	Clayey, mixed, thermic Typic Haploxerults.
Hanford	Coarse-loamy, mixed, nonacid, thermic Typic Xerorthents.
Henneke	Clayey-skeletal, serpentinitic, thermic Lithic Argixerolls.
Junipero	Coarse-loamy, mixed, mesic Pachic Ultic Haploxerolls.
Linne	Fine-loamy, mixed, thermic Calcic Pachic Haploxerolls.
Lockwood	Fine-loamy, mixed, thermic Pachic Argixerolls.
Lopez	Loamy-skeletal, mixed, thermic Lithic Ultic Haploxerolls.
Los Gatos	Fine-loamy, mixed, mesic Typic Argixerolls.
Los Osos	Fine, montmorillonitic, thermic Typic Argixerolls.
McCoy	Fine-loamy, mixed, thermic Pachic Argixerolls.
McCoy variant	Loamy-skeletal, mixed, thermic Pachic Argixerolls.
McMullin	Loamy, mixed, mesic Lithic Ultic Haploxerolls.
Metz	Sandy, mixed, thermic Typic Xerofluvents.
Millsholm	Loamy, mixed, thermic Lithic Xerochrepts.
Mocho	Fine-loamy, mixed, thermic Fluventic Haploxerolls.
Montara	Loamy, serpentinitic, thermic Lithic Haploxerolls.
Nacimiento	Fine-loamy, mixed, thermic Calcic Haploxerolls.
Narlon	Clayey, mixed, thermic Typic Albaquults.
Oceano	Mixed, thermic Alfic Xeropsamments.
Pacheco	Fine-loamy, mixed, thermic Fluvaquentic Haploxerolls.
Parkfield	Fine, montmorillonitic, thermic Vertic Argixerolls.
Pfeiffer	Coarse-loamy, mixed, thermic Typic Haploxerolls.
Pico	Coarse-loamy, mixed, thermic Fluventic Haploxerolls.
Pinnacles	Fine, montmorillonitic, thermic Ultic Palexeralfs.
Pinnacles variant	Clayey-skeletal, montmorillonitic, thermic Ultic Palexeralfs.
Placentia	Fine, montmorillonitic, thermic Typic Natrixeralfs.
Plaskett	Loamy-skeletal, mixed, mesic Lithic Haploxerolls.
Psamments, flooded	Psamments.
Reliz	Loamy-skeletal, mixed, nonacid, thermic Lithic Xerorthents.
Rincon	Fine, montmorillonitic, thermic Mollic Haploxeralfs.
Rindge	Euic, thermic Typic Medisaprists.
Salinas	Fine-loamy, mixed, thermic Pachic Haploxerolls.
San Andreas	Coarse-loamy, mixed, thermic Typic Haploxerolls.
San Benito	Fine-loamy, mixed, thermic Typic Haploxerolls.
San Timoteo	Coarse-loamy, mixed (calcareous), thermic Typic Xerorthents.
Santa Lucia	Clayey-skeletal, mixed, thermic Pachic Ultic Haploxerolls.
Santa Ynez	Fine, montmorillonitic, thermic Ultic Palexerolls.
Shedd	Fine-silty, mixed (calcareous), thermic Typic Xerorthents.
Sheridan	Coarse-loamy, mixed, thermic Pachic Haploxerolls.
Snelling	Fine-loamy, mixed, thermic Typic Haploxeralfs.
Sorrento	Fine-loamy, mixed, thermic Calcic Haploxerolls.
Sur	Loamy-skeletal, mixed, mesic Entic Haploxerolls.

TABLE 14.—*Classification of the soils*—Continued

Soil name	Family or higher taxonomic class
Tangair	Mixed, thermic Aquic Durorthidic Xeropsamments.
Tujunga	Mixed, thermic Typic Xeropsamments.
Vista	Coarse-loamy, mixed, thermic Typic Xerochrepts.
Xererts	Xererts.
Xerolls	Xerolls.
Xerorthents, dissected	Xerorthents.
Xerorthents, loamy	Xerorthents.
Xerorthents, sandy	Xerorthents.
Xerorthents, shallow	Xerorthents.

[1] Clear Lake soils as mapped in this area are taxadjuncts because they are classified as being in a fine, montmorillonitic, thermic family of Chromic Pelloxererts.

[2] Dibble soils as mapped in this area are taxadjuncts because they are classified as being in a fine, montmorillonitic, thermic family of Ultic Haploxeralfs.

except those for bulk density, were made in the soil material smaller than 2-millimeters. All results are expressed on an oven-dry basis.

In the following discussion, methods are identified by code. An explanation of the codes and details of the analysis used are available to readers who want them (*28*). The samples were analyzed by the Soil Survey Laboratory, Soil Conservation Service, Riverside, California.

Particle size analyses (method 3A1).—The particle-size distribution was determined by pipette and sieve analyses. After treatment of the sample to remove organic matter and soluble salts, the particles were dispersed with sodium hexametaphosphate and mechanical shaking.

Particle size analyses are used to measure gains and losses of soil particles in the horizons of soil profiles, and thus may be used to study such processes as clay movement and weathering in soils. The amount of clay in a sample can also be used to estimate other properties, such as the cation exchange capacity and the amount of water in soils at the wilting point. Montmorillonitic clays have cation exchange capacities of about 80 to 150 me/100 g, illitic clays, 10 to 40 me/100 g, and kaolinitic clays, 3 to 15 me/100 g. Many of the clays in the soils of the county have a mixture of montmorillonite and illite and have a cation exchange capacity of 40 to 80 me/100 g of clay. In soils that disperse well, the clay content is about 2½ times the water content at the permanent wilting point. Particle size analysis data also help locate discontinuities in soils that affect movement of water. They help in identifying kinds of soils and sedimentary deposits and in locating the sources of sediments.

Bulk density (method 4A1).—The bulk density for one-third bar water content and for oven dryness was determined on saran-coated natural soil clods. The clods were equilibrated to one-third bar water content on a pressure plate apparatus, and the volume of the clods was determined by the displacement of water. If the clods contained gravel-size particles, corrections were made for weight and volume, and the data were reported for the soil particles less than 2-millimeters in size.

Bulk density is a measure of the dry weight of soil per unit of volume. It is used to calculate the Cm factor (method 3B2) and linear extensibility (method 4D1), which will be discussed later. Bulk density may also be used to detect soil horizons that would limit plant growth. Growth of roots is restricted by moist soils with densities as high as 1.8 per cm^3.

Water retention.—Water retention of soils at ⅓ bar corresponds fairly closely to field capacity (method 4B1c), and that at 15 bar, to the permanent wilting point (method 4B2). Hence, the differences between the two percentages would represent the percentage available for plant growth. This percentage can be converted to an amount of water by multiplying it by bulk density, the thickness of the layer, and the cross-sectional area.

Linear extensibility (method 4D1).—Linear extensibility is a measure of the change in the vertical dimensions of the natural fabric of a soil in going from a dry (that is, oven-dry) to a moist (⅓ bar) state. Linear extensibility of the natural fabric approximates the change in volume that the same soil would undergo as it becomes wet if it has been compacted and used as a foundation, since the wider range in moisture content (oven-dry to field capacity) of the laboratory sample compensates for the higher density of the compacted foundation material.

Cm factor (method 3B2).—The Cm factor of soils is used to make comparisons of soil properties on a volume basis. For example, the amount of organic carbon is given as a percentage of weight. In order to find the amount (gms.) of organic carbon in the surface, cm^2 to depth of 25 cm, the weight percentage is multiplied by 25 cm and then by the Cm factor. The Cm factor multiplied by 100 gives the percentage of fine earth fabric in the whole soil. The volume percentage of $>$ 2 mm material is the difference between this value and 100.

Atterberg limits.—Atterberg limits describe the range in the content of water above which soils are plastic. The liquid limit (method 4F1), or the upper limit, is the water content at which soil changes from a plastic to a liquid. Its water content is a little less than the saturation percentage and more than ⅓ bar. The plastic limit (method 4F2), or the lower limit, is the water content at which soils begin to crumble while being rolled into a thread. The range in water content between these two limits is called the plastic index. The

plastic index and the liquid limit are used to classify soils for engineering purposes.

Cation exchange capacity (method 5A2a).—The cation exchange capacity was determined by saturating the samples with sodium by mixing them with a solution of sodium acetate. The amount of exchangeable sodium that was later extracted, using ammonium acetate, represents the cation exchange capacity. Another method using ammonium acetate (method 5A1a) was used to saturate the sample with ammonia (NH). The exchange capacity was determined by direct distillation of absorbed ammonia by Kjeldahl.

The cation exchange capacity of a soil measures the capacity of its clay and organic fractions to store cations in exchangeable form. The measurement has a number of important uses.

In combination with the clay content, it can be used to determine the dominant kind of clay mineral in a soil. In combination with the percentage of clay and 15 bar water, it can be used to detect amorphous materials or materials, except for glass, which retain large amounts of water and have a large CEC (cation exchange capacity) relative to the measured amount of clay.

The CEC measurement is made at pH 7 by the ammonium acetate method (method 5A1a) or measured with sodium acetate at pH 8.2 (method 5A2a). The difference in the data obtained by these methods is small for soils with crystalline minerals like montmorillonite or kaolinite where there is little organic matter. In horizons that have 1 percent or more organic matter, the difference is relatively large. Cation exchange capacity in acid soils is sometimes measured by the sum of cations and extractable acidity at pH 8.2 (method 5A3). Data obtained by this method is comparable to that obtained by the sodium acetate method. Capacities measured by either of these methods are markedly higher than those measured by the ammonium acetate method for soils with amorphous clays. This is because these clays have a number of sites on the colloid where exchange can take place only if pH is above 7.

Extractable bases method (5B1a).—Extractable bases are the amounts of calcium, magnesium, sodium, and potassium extracted by ammonium acetate at pH 7. Calcium was precipitated as an oxalate and titrated with permanganate; magnesium was determined gravimetrically as magnesium pyrophosphate; sodium and potassium were analyzed by flame photometer. In soils with calcium and magnesium carbonates, the lower pH of ammonium acetate extracts a little calcium and magnesium from these sources resulting in slightly higher extractable calcium and magnesium values. In soils which lack salt, the extractable bases are equivalent to *exchangeable bases*, but in soils which have salt, the bases in the saturation extract must be subtracted from the extractable bases to find the amount of exchangeable bases (method 5B1b).

Extractable hydrogen (method 6H2a).—Extractable hydrogen, or exchange acidity, was determined using triethanolamine and barium chloride at pH 8.2.

Base saturation.—Base saturation may be calculated using any one of the cation exchange capacities, but base saturation will not be the same for each one. Base saturation calculated from the ammonium acetate cation exchange capacity (method 5C1) will be the highest; that calculated by either the sum of cations (method 5C) or sodium acetate method (method 5C2) will be the lowest. As pointed out in a previous section, the sodium acetate method and the sum of cations method may be used interchangeably.

Exchangeable sodium percentage (method 5D2).—The exchangeable sodium percentage is a value derived by dividing the exchangeable sodium by the cation exchange capacity and multiplying the result by 100. Soils with fine textures and exchangeable sodium percentages greater than about 15 may have poor physical properties. Irrigation water low in sodium should be used for these soils if they are cropped.

Organic matter.—The organic matter in soils is estimated by multiplying the amount of organic carbon by the factor 1.732. The percentage of organic carbon was determined by acid-dichromate digestion and ferrous sulfate titration, a modification of the Walkley-Black method (method 6A1a).

Organic matter has a cation exchange capacity of several hundred me/100 g, thus adding considerably to the cation exchange capacity of soils. Much of its cation exchange capacity, however, is realized only at high pH. Likewise organic matter increases the amount of water held by soils, but only a small part of this is in the range of 15 bar to ⅓ bar.

Nitrogen.—The amount of nitrogen in organic matter is measured by the Kjedahl method (method 6B1a). It is commonly about one-tenth of the organic carbon in well decomposed organic matter. In less well decomposed organic matter, ratios may be much higher. Estimates of rates of mineralization of organic nitrogen are from 1 to 3 percent per year, depending on soil moisture, soil temperature, and the degree of decomposition of the organic matter.

Extractable iron.—To reduce and extract the iron, the soil sample was treated with a citrate-buffered, sodium-dithionite solution. The extractable iron was measured colormetrically (method 6C2a). Extractable iron is a measure of soil weathering. Highly weathered soils tend to contain more extractable iron than slightly weathered ones.

Carbonate.—The percentage of carbonate in the soil sample was determined by measuring the volume of carbon-dioxide gas that was evolved when hydrochloric acid was added to the sample. The percent reported is that amount equivalent to calcium carbonate (method 6Eb1).

Calcium carbonate measured in soils may be either in primary or secondary form, and morphology can be used as a guide in determining the kind of carbonate. For example, the calcium carbonate lining pores and coating gravel is secondary and that in rounded gravel is primary. Much of the carbonate in the clay fraction is secondary, as can be seen from its distribution in the soil profiles. Significant amounts of carbonate may be dissolved by ammonium acetate extraction at pH 7. In carbonatic soils, either sodium acetate or potassium chloride-triethanolamine, both of which are buffered at pH 8.2, are better extractants for exchangeable bases.

Ions in the Saturation Extract.—The amount of ions in the saturation extract, expressed as milliequivalents per liter, was determined by analyzing the water ex-

TABLE 15.—*Laboratory*

[Analyses by Soil Survey Investigations Unit,

Soil	Sample number S65 Calif-27-	Depth	Horizon	Size class and particle size of fraction less than 2 millimeters in diameter: Total: Sand (2–0.05 mm)	Total: Silt (0.05–0.002 mm)	Total: Clay (less than 0.002 mm)	Sand: Very coarse (2–1 mm)	Sand: Coarse (1–0.5 mm)	Sand: Medium (0.5–0.25 mm)	Sand: Fine (0.25–0.1 mm)	Sand: Very fine (0.1–0.05 mm)	Silt: (0.05–0.02 mm)	Silt: Int. III (0.02–0.002 mm)	Int. II (0.2–0.02 mm)
		Inches		*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Chualar loam	13	0–7	Ap	62.1	27.7	10.2	15.4	16.7	8.7	13.1	8.2	16.2	11.5	31.4
		7–21	A12	62.0	27.0	11.0	13.0	16.9	9.0	13.7	9.4	15.8	11.2	32.6
		21–30	B1t	57.3	28.5	14.2	12.2	15.2	7.8	13.1	9.0	16.3	12.2	32.7
		30–44	B21t	49.2	28.4	22.4	9.1	11.0	5.3	12.8	11.0	14.7	13.7	33.9
		44–55	B22t	57.9	24.3	17.8	17.5	14.8	6.2	10.8	8.6	12.6	11.7	27.6
		55–59	B3	78.9	11.5	8.7	25.7	24.0	10.8	13.7	5.6	6.3	5.2	18.7
		59–80	C	91.1	4.4	4.5	20.6	31.1	17.8	17.8	3.8	2.6	1.8	14.1
Diablo clay	10	0–5	A11	8.2	35.1	56.7	.4	.5	.4	1.4	5.5	14.0	21.1	20.4
		5–18	A12	8.9	34.3	56.8	.4	.5	.2	1.1	6.7	13.3	21.0	20.8
		18–30	A13	7.6	34.6	57.8	.4	.4	.2	.9	5.7	13.7	20.9	20.1
		30–39	A14	6.8	34.7	58.5	.3	.3	.2	.7	5.3	14.3	20.4	20.1
		39–53	AC	7.2	35.1	57.7	.4	.3	.2	.7	5.6	14.6	20.5	20.7
		53–68+	C	21.0	52.9	26.1	0	1.4	3.2	7.7	8.7	19.7	33.2	32.9
Gloria sandy loam.	16	0–8	Ap1	54.4	31.6	14.0	7.8	14.6	8.9	14.4	8.7	17.6	14.0	33.6
		8–15	A12	52.9	29.4	17.7	8.1	14.6	8.3	13.1	8.8	15.3	14.1	31.0
		15–16	A2	52.9	31.8	15.3	10.3	13.8	7.6	12.5	8.7	16.9	14.9	32.2
		16–23	B2t	32.6	18.5	46.9	7.6	9.4	5.2	7.6	4.8	9.9	8.6	18.8
		[6] 23–32	[7] B31sim–1	78.1	15.6	6.3	15.1	24.7	13.1	16.7	8.5	8.7	6.9	25.8
		[6] 32–41	[7] B31sim–2	72.4	20.0	7.6	21.9	20.1	9.6	13.5	7.3	10.0	10.0	24.4
		[6] 41–57	[7] B32sim–1	68.6	21.5	9.9	17.9	19.5	8.5	14.6	8.1	9.7	11.8	25.8
		[6] 57–68	[7] B32sim–2	65.9	21.3	12.8	16.7	18.7	9.1	13.7	7.7	11.4	9.9	26.5
		[6] 68–69+	[7] B32sim–3	------	------	------	------	------	------	------	------	------	------	------
		0–14	[10] B31sim	------	------	------	------	------	------	------	------	------	------	------
		14–27	[10] B32sim	------	------	------	------	------	------	------	------	------	------	------
		27–80	[10] C1	72.1	13.4	14.5	19.7	15.3	9.8	19.2	8.1	6.4	7.0	24.8
Linne silty clay loam.	4	0–4	A11	19.0	50.5	30.5	.7	.9	1.3	5.9	10.2	30.6	19.9	44.6
		4–16	A12	18.8	48.0	33.2	.8	.9	1.3	5.5	10.3	28.0	20.0	42.0
		16–32	A13	19.5	46.2	34.3	1.4	.9	1.1	5.5	10.6	26.4	19.8	40.7
		[13] 32–36	A14ca	18.2	46.9	34.9	.4	1.1	1.2	5.2	10.3	25.6	21.3	39.3
		[13] 36–45	C1	31.7	46.2	22.1	3.8	5.2	4.9	7.7	10.1	16.2	30.0	30.6
		45–60	C2	38.1	46.1	15.8	2.8	5.7	4.8	9.9	14.9	20.2	25.9	41.4
		45–60	[14] Shale	34.0	46.8	19.2	.7	3.1	3.2	11.8	15.2	21.0	25.8	44.3
Lockwood shaly loam.[15]	1	0–3	Ap1	33.0	45.8	21.2	4.7	6.0	3.6	6.5	12.2	27.3	18.5	43.2
		3–16	Ap2	37.0	43.6	19.4	6.2	6.9	3.9	6.5	13.5	26.4	17.2	43.6
		16–26	A13	34.8	44.6	20.6	4.2	6.0	3.8	6.1	14.7	28.2	16.4	46.4
		26–40	B1	35.8	44.6	19.6	4.8	6.0	3.7	6.3	15.0	29.0	15.6	47.7
		40–57	B21t	55.2	26.7	18.1	17.0	13.2	5.8	8.3	10.9	14.5	12.2	29.6
		57–82	B22t	56.8	18.7	24.5	15.9	14.8	6.6	9.5	10.0	9.1	9.6	23.9
		82+	IIC	30.0	41.5	28.5	3.4	4.0	2.4	6.5	13.7	23.0	18.5	40.7
Placentia sandy loam.	14	0–5	Ap1	52.5	33.8	13.7	11.8	12.7	7.6	12.3	8.1	16.4	17.4	31.2
		5–12½	[18] Ap2	52.9	33.8	13.3	11.2	13.9	7.5	11.8	8.5	16.0	17.8	31.0
		12½–20	B21t	35.1	17.3	47.6	7.4	8.1	5.2	8.7	5.7	7.7	9.6	18.2
		20–29	B22t	49.8	16.8	33.4	9.5	11.0	7.3	14.3	7.7	7.2	9.6	22.9
		29–36	B23tca	54.6	17.1	28.3	10.3	14.3	8.7	14.2	7.1	7.4	9.7	21.8
		36–42	B24t	54.3	20.3	25.4	12.1	14.9	7.7	12.0	7.6	9.9	10.4	23.4
		42–58	B3t	61.1	20.1	18.8	12.3	17.1	9.7	14.4	7.6	10.4	9.7	25.3
		58–68	[19] C	54.3	18.2	16.5	13.9	18.2	10.5	15.6	7.1	9.4	8.8	24.3
		----------	Auger	70.5	11.5	18.0	10.7	16.8	12.1	22.6	8.3	6.1	5.4	25.6

See footnotes at end of table.

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Size class and particle size of fraction less than 2 millimeters in diameter—Con.			Coarse fragments more than 2 millimeters in diameter			Organic carbon	Nitrogen	C/N	Extractable iron as Fe	Carbonate as $CaCO_3$ in less than 2 millimeter fraction	Bulk density		Cm	Water content		Extensibility	
2–0.1 mm	Carbonate clay	Noncarbonate clay	Total	2–19 mm	19–76 mm						1/3 bar	Oven dry		1/3 bar	15 bar	COLE f	COLE
Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*		*Percent*	*Percent*	*Gm/cc*	*Gm/cc*		*Percent*	*Percent*	*Cm/cm*	*Cm/cm*
53.9	----	----	11	11	0	[1] 0.89	0.080	11	0.6	(2)	[3] 1.60	----	0.93	----	4.6	----	----
52.6	----	----	14	14	0	[1] .70	.063	11	.7	(2)	1.61	1.64	.91	10.7	5.0	0.006	0.005
48.3	----	----	10	10	0	[3] .32	----	----	.9	(2)	1.79	1.82	.93	12.0	5.8	.006	.005
38.2	----	----	16	16	0	.21	----	----	1.4	(2)	1.81	1.89	.88	15.1	10.0	.015	.013
49.3	----	----	21	21	0	.16	----	----	1.1	(2)	1.85	1.91	.84	13.3	8.0	.011	.009
74.2	----	----	32	29	3	.07	----	----	.6	(2)	1.65	1.68	.77	8.4	4.2	.006	.004
87.3	----	----	35	32	3	.06	----	----	.4	(2)	[3] 1.65	----	.75	----	2.6	----	----
2.7	0	57	(4)	(4)	(4)	2.12	.351	6	----	(2)	1.18	1.65	1.00	39.8	33.2	.118	.118
2.2	0	57	(4)	(4)	(4)	1.02	.102	10	----	(2)	1.19	1.56	1.00	36.8	29.2	.093	.093
1.9	0	58	(4)	(4)	(4)	.74	----	----	----	(2)	1.25	1.59	1.00	35.2	28.9	.084	.084
1.5	0	59	(4)	(4)	(4)	.50	----	----	----	(2)	1.25	1.68	1.00	35.9	32.4	.102	.102
1.6	0	58	(4)	(4)	(4)	.39	----	----	----	(2)	1.20	1.57	1.00	36.6	30.6	.095	.095
12.3	0	26	(4)	(4)	(4)	.05	----	----	----	(2)	1.13	1.25	1.00	49.3	36.0	.034	.034
45.7	0	14	10	10	[5] 0	.62	.062	10	.8	(2)	1.69	1.71	.93	10.6	4.9	.004	.004
44.1	0	18	12	12	[5] 0	.29	.044	7	.9	(2)	1.59	1.62	.92	11.6	5.6	.008	.007
44.2	0	15	12	12	[5] 0	.16	----	----	.9	(2)	1.78	1.82	.92	11.1	4.7	.007	.007
29.8	0	47	15	15	[5] 0	.36	----	----	1.5	(2)	1.55	1.86	.90	23.7	16.2	.064	.057
69.6	0	6	----	----	(8)	.04	----	----	1.0	(9)	1.81	1.82	.75	11.4	7.3	.002	.001
65.1	0	8	----	----	(8)	.08	----	----	.5	(9)	1.86	1.88	.74	11.2	5.7	.004	.003
60.5	0	10	----	----	(8)	.12	----	----	.4	(2)	----	----	----	----	5.5	----	----
58.2	0	13	----	----	(8)	.13	----	----	.4	(1)	----	----	----	----	5.0	----	----
----	----	----	----	----	(8)	----	----	----	----	(2)	----	----	----	----	5.5	----	----
----	----	----	----	----	(8)	----	----	----	----	(2)	----	----	----	----	----	----	----
----	----	----	----	----	(8)	----	----	----	----	(1)	----	----	----	----	----	----	----
64.0	0	15	33	33	[5] 0	----	----	----	.4	(1)	----	----	----	----	----	----	----
8.8	----	----	[11] G	----	----	[12] 3.90	.330	12	----	1	1.42	1.67	1.00	27.6	14.5	.056	.056
8.5	----	----	[11] G	----	----	[12] 1.16	.114	10	----	4	1.23	1.43	1.00	26.8	14.1	.050	.050
8.9	----	----	[11] G	----	----	[12] .79	----	----	----	6	1.22	1.40	1.00	27.5	15.0	.046	.046
7.9	----	----	[11] G	----	----	[12] .61	----	----	----	10	1.21	1.36	1.00	30.1	17.4	.039	.039
21.6	----	----	[11] G	----	----	[12] .27	----	----	----	31	1.07	1.08	1.00	45.2	13.7	.004	.004
23.2	----	----	[11] G	----	----	[12] .16	----	----	----	15	1.49	1.58	1.00	28.7	18.0	.020	.020
18.8	----	----	[11] G	----	----	[12] .18	----	----	----	8	----	----	----	----	21.6	----	----
20.8	0	21	(16)	(16)	[9]	2.21	.211	10	----	(2)	----	----	----	----	19.5	----	----
23.5	0	19	(16)	(16)	[9]	1.48	.078	19	----	(2)	1.17	1.20	1.00	30.0	19.8	.008	.008
20.1	0	21	(16)	(16)	1	.79	----	----	----	(2)	1.11	1.14	1.00	31.5	19.0	.009	.009
20.8	0	20	(16)	(16)	12	.62	----	----	----	(2)	1.11	1.14	1.00	31.2	18.7	.010	.010
44.3	0	18	(16)	(16)	24	.21	----	----	----	(2)	1.18	1.23	1.00	34.4	28.6	.013	.013
46.8	0	25	(16)	(16)	26	.21	----	----	----	(2)	1.14	1.17	1.00	38.0	32.8	.009	.009
16.3	0	29	(16)	(16)	0	.19	----	----	----	(2)	1.08	1.14	1.00	41.2	26.2	.018	.018
44.4	0	14	[17] 8	8	[5] 0	.97	.087	11	.9	(2)	1.57	1.60	.95	13.3	5.4	.007	.006
44.4	0	13	[17] 8	8	[5] 0	.86	.072	12	.8	(2)	1.58	1.63	.95	11.4	5.2	.001	.010
29.4	0	48	[17] 8	8	[5] 0	.68	----	----	1.4	(2)	1.46	1.81	.95	28.1	19.8	.073	.069
42.1	0	33	[17] 18	18	[5] 0	.33	----	----	1.2	1	1.56	1.89	.89	24.1	15.0	.066	.058
47.5	0	28	[17] 20	20	[5] 0	.18	----	----	1.1	1	1.62	1.85	.87	19.9	12.4	.045	.039
46.7	0	25	[17] 11	11	[5] 0	.11	----	----	.8	(2)	1.73	1.87	.93	15.0	10.4	.026	.024
53.5	0	19	[17] 15	15	[5] 0	.13	----	----	.6	(2)	1.73	1.79	.89	12.0	7.3	0.11	.010
58.2	0	17	[17] 36	24	12	.06	----	----	.5	(2)	1.76	1.82	.83	10.9	6.9	0.11	.009
62.2	0	18	[17] 15	15	[5] 0	.16	----	----	.7	(2)	----	----	----	----	8.2	----	----

TABLE 15.—*Laboratory*

Soil	Sample number S65 Calif-27-	Depth	Horizon	Size class and particle size of fraction less than 2 millimeters in diameter: Total			Sand					Silt		
				Sand (2–0.05 mm)	Silt (0.05–0.002 mm)	Clay (less than 0.002 mm)	Very coarse (2–1 mm)	Coarse (1–0.5 mm)	Medium (0.5–0.25 mm)	Fine (0.25–0.1 mm)	Very fine (0.1–0.05 mm)	(0.05–0.02 mm)	Int. III (0.02–0.002 mm)	Int. II (0.2–0.02 mm)
		Inches		*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*
Salinas clay loam.	11	0–5	Ap1	43.2	32.2	24.6	.4	1.0	1.7	19.4	20.7	14.9	17.3	50.2
		5–13	Ap2	43.7	31.7	24.6	.5	.8	1.6	19.3	21.5	14.6	17.1	50.9
		13–23	A13	32.8	40.9	26.3	.1	.1	.3	12.5	19.8	18.1	22.8	48.4
		23–33	A14	42.9	36.7	20.4	.1	.3	.4	17.0	25.1	18.6	18.1	58.1
		33–40	C1	63.4	25.1	11.5	.2	.3	.7	26.7	35.5	16.8	8.3	74.6
		40–49	C2	70.1	21.0	8.9	.2	.3	.7	29.0	39.9	15.6	5.4	79.8
		49–75+	C3	61.3	29.0	9.7	.1	.2	.3	15.2	45.5	21.9	7.1	80.6
Shedd silty clay loam.	8	0–5	A11	10.0	58.5	31.5	.5	.9	1.0	3.7	3.9	24.2	34.3	30.2
		5–12	A12	10.0	56.4	33.6	.3	.6	.8	3.7	4.6	23.1	33.3	30.0
		12–23	A13	11.9	54.9	33.2	.4	.9	1.1	4.3	5.2	21.8	33.1	29.6
		[13] 23–30	C1ca	13.0	54.7	32.3	.4	1.0	1.6	5.1	4.9	20.8	33.9	28.6
		[12] 30–50	C2	7.9	55.7	36.4	.1	.3	.6	4.9	2.0	17.3	38.4	22.2
		50–67+	C2	9.5	56.1	34.4	.2	1.0	1.1	4.8	2.4	15.9	40.2	21.1
		50–67+	[21] C2	------	------	------	------	------	------	------	------	------	------	------
Sheridan coarse sandy loam.	24	0–8	A11	71.3	17.7	11.0	16.5	22.0	9.9	16.1	6.8	7.3	10.4	21.7
		8–18	A12	71.6	17.1	11.3	17.3	21.9	9.4	15.7	7.3	6.7	10.4	22.0
		18–28	A13	69.5	18.5	12.0	12.9	20.9	9.7	17.1	8.9	7.9	10.6	25.3
		28–39	A14	70.0	18.6	11.4	11.8	20.4	9.6	18.6	9.6	7.9	10.7	26.6
		39–43	C1	87.7	8.4	3.9	26.9	30.9	9.4	15.1	5.4	4.7	3.7	17.1
		43–57+	C2	89.2	8.7	2.1	25.1	30.8	10.6	16.4	6.3	5.3	3.4	19.4

[1] 8.0 kg of organic carbon per square meter to a depth of 1 meter.
[2] Looked for but not found.
[3] Estimated.
[4] Apparent coarse fragments dispersed readily. Hence the characterization sample was ground whole and all chemical and physical data are on a whole soil basis.
[5] 2–19 millimeters from characterization sample, and 19–76 millimeters from field volume estimate.
[6] These horizons were combined in the profile description to be 23–41 inches and 41–69 inches.
[7] The B31sim and B32sim horizons were sub-sampled.
[8] Greater than 2 millimeters not determined. Characterization sample ground whole.
[9] Trace.
[10] The lower part of the profile was described and sampled in a road cut 30 yards east of the pit.
[11] G = ground whole. Coarse shale fragments dispersed readily.

tracted from a saturated soil paste. The water was removed by vacuum filtration, and the soluble ions were determined by the following procedures: sodium and potassium by flame photometry; calcium and magnesium by titration with versenate; and chloride by titration with silver nitrate (methods 6P1a, 6Q1a, 6N1s, 6O1a, 6K1a).

Electrical conductivity as an estimate of soluble salts in the saturation extract was measured by Wheatstone bridge. The conductivity is reported in millimhos per centimeter at the standard temperature of 25° C (method 8A1a). Conductivity of the saturation extract is a general measure of the amount of salt in solution. Conductivities about 4 mmhos/cm (EC $\times$ 10^3) restrict the yields of many plants. For conductivities below 10 mmhos/cm (EC $\times$ 10^3), the concentration of salts is about 10 times the conductivity.

Reaction.—Soil reaction, expressed in pH value, was obtained by a glass electrode using a 1:1 soil-water ratio and a 1:1 soil ratio (method 8C1a).

Environmental Factors Affecting Soil Use

This section gives general information about the soils in Monterey County. It discusses the plants, geol-

analysis, Part I—Continued

Size class and particle size of fraction less than 2 millimeters in diameter—Con.			Coarse fragments more than 2 millimeters in diameter			Organic carbon	Nitrogen	C/N	Extractable iron as Fe	Carbonate as $CaCO_3$ in less than 2 millimeter fraction	Bulk density		Cm	Water content		Extensibility	
2–0.1 mm	Carbonate clay	Noncarbonate clay	Total	2–19 mm	19–76 mm						1/3 bar	Oven dry		1/3 bar	15 bar	COLE f	COLE
Percent	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*	*Percent*		*Percent*	*Percent*	*Gm/cc*	*Gm/cc*		*Percent*	*Percent*	*Cm/cm*	*Cm/cm*
22.5	0	25	[17] 0	0	[5] 0	1.36	.129	11	------	([2])	([20])	([20])	------	([20])	11.8	([20])	([20])
22.2	0	25	[17] 0	0	[5] 0	1.26	.116	11	------	([2])	([20])	([20])	------	([20])	12.7	([20])	([20])
13.0	0	26	[17] 0	0	[5] 0	1.17	------	------	------	([2])	([20])	([20])	------	([20])	14.0	([20])	([20])
17.8	0	20	[17] 0	0	[5] 0	.84	------	------	------	([2])	([20])	([20])	------	([20])	11.2	([20])	([20])
27.9	0	12	[17] 0	0	[5] 0	.41	------	------	------	([2])	([20])	([20])	------	([20])	6.9	([20])	([20])
30.2	0	9	[17] 0	0	[5] 0	.30	------	------	------	([9])	([20])	([20])	------	([20])	5.4	([20])	([20])
15.8	0	10	[17] 0	0	[5] 0	.15	------	------	------	2	([20])	([20])	------	([20])	6.0	([20])	([20])
6.1	0	32	([4])	------	------	2.10	.200	11	------	4	1.18	1.30	1.00	33.6	27.5	.033	.033
5.4	1	33	([4])	------	------	1.18	.118	10	------	6	1.04	1.19	1.00	37.0	23.2	.045	.045
6.7	2	31	([4])	------	------	1.00	------	------	------	8	.98	1.12	1.00	38.4	24.4	.044	.044
8.1	2	30	([4])	------	------	.71	------	------	------	8	1.00	1.13	1.00	40.0	28.2	.043	.043
5.9	0	36	([4])	------	------	.10	------	------	------	2	1.15	1.30	1.00	48.8	38.4	.042	.042
7.1	0	34	([4])	------	------	.06	------	------	------	([9])	1.17	1.33	1.00	47.0	36.2	.043	.043
------	------	------	([4])	------	------	------	------	------	------	------	------	------	------	------	30.6	------	------
64.5	0	11	[17] 9	9	[5] 0	1.68	.129	13	------	------	1.51	1.54	.95	12.0	5.0	.005	.005
64.3	0	11	[17] 12	12	[5] 0	.73	.062	12	------	------	1.44	1.45	.93	13.2	5.1	.003	.003
60.6	0	12	[17] 16	16	[5] 0	.52	------	------	------	------	1.44	1.49	.91	13.6	5.8	.010	.009
60.4	0	11	[17] 11	11	[5] 0	.37	------	------	------	------	1.55	1.59	.93	13.3	6.1	.007	.007
82.3	0	4	[17] 16	16	[5] 0	.15	------	------	------	------	1.95	1.99	.88	7.5	2.7	.007	.006
82.9	0	2	[17] 25	25	[5] 0	.08	------	------	------	------	2.07	2.07	.79	6.7	2.3	.001	0

[12] 14.8 kg of organic carbon per square meter to a depth of 1 meter.
[13] These horizons were combined in the profile description.
[14] Sample of C2 from which carbonate coatings were removed.
[15] Another profile near this site was analyzed and found to have moderate amounts of amorphous clays in all horizons.
[16] Apparent coarse fragments dispersed readily. Hence the greater than 19 millimeter material was ground whole and included in the characterization sample. All chemical and physical data are on greater than 19 millimeter basis. The 19–76 millimeter fraction was determined from field weights.
[17] From characterization sample (5 kg) (except as noted); use 65467 as estimate of greater than 2 millimeter material in pan horizons.
[18] The A2 horizon (12.5–13") was not sampled.
[19] Auger sample from below base of pit.
[20] Additional data is available for a similar soil given in Soil Survey Investigations Report No. 24, SCS, USDA, June 1973, for California.
[21] C2 horizon material (shale) from which lime coatings were removed.

ogy, and relief of the county as well as trends in soil uses. Important environmental factors such as water supply and climate are also briefly described.

Plants

The plant cover in Monterey County ranges from areas of large pines and redwoods to dense chamise thickets and open grasslands.

Deep soils in canyons that have summer fog support redwoods as well as tanoak and madrone. Moderately deep and deep soils on north- and east-facing sites in the Santa Lucia Mountains do not receive summer fog and commonly support madrone and laurel, tanoak and ponderosa pine.

Near the coast, soils on unshaded west- and south-facing sites commonly grow coastal shrubs such as coyote brush, California sage, and deer vetch.

Other soils of the Santa Lucia Mountains mainly support scattered oaks and grass, with some Coulter pine or digger pine, canyon live oak, interior live oak, and manzanita. Steeper, shallow, south- and west-facing sites commonly are dominated by chamise, manzanita, buckbrush, and scrub oaks. Especially droughty sites generally have a sparse plant cover made up largely of chamise and yucca.

Inland, in the Gabilan Range, calcareous soils that

TABLE 16.—*Laboratory*

[Analyses by Soil Survey Investigations Unit,

Soil	Sample number S65 Calif–27–	Depth (Inches)	Horizon	Reaction in 1:1 soil-water suspension (pH)	Extractable bases: Ca (Meq. per 100 grams of soil)	Extractable bases: Mg (Meq. per 100 grams of soil)	Extractable bases: Na (Meq. per 100 grams of soil)	Extractable bases: K (Meq. per 100 grams of soil)	Extractable bases: Sum of bases (Meq. per 100 grams of soil)	Extractable acidity (Meq. per 100 grams of soil)	Cation exchange capacity: Na-OAc (Meq. per 100 grams of soil)	Cation exchange capacity: NH_4-OAc (Meq. per 100 grams of soil)	Water extracted from saturated paste: Ca (Meq. per liter)	Water extracted from saturated paste: Mg (Meq. per liter)	Water extracted from saturated paste: Na (Meq. per liter)	Water extracted from saturated paste: K (Meq. per liter)
Chualar loam.	13	0–7	Ap	7.6	7.3	2.0	0.3	0.6	10.2	------	------	8.0	------	------	------	------
		7–21	A12	8.1	7.7	1.8	.4	.4	10.3	------	------	8.1	------	------	------	------
		21–30	B1t	8.0	6.7	2.2	.4	.2	9.5	------	------	8.8	------	------	------	------
		30–44	B21t	7.3	9.2	6.9	.5	.3	16.9	------	------	17.4	------	------	------	------
		44–55	B22t	7.2	8.5	6.5	.5	.2	15.7	------	------	15.9	------	------	------	------
		55–59	B3	6.9	4.1	3.4	.3	.1	7.9	------	------	7.4	------	------	------	------
		59–80	C	7.0	2.4	1.9	.2	.1	4.6	------	------	4.6	------	------	------	------
Diablo clay	10	0–5	A11	6.8	34.1	12.1	.3	1.4	47.9	------	------	44.6	------	------	------	------
		5–18	A12	6.9	34.3	11.2	.6	.7	46.8	------	------	45.8	------	------	------	------
		18–30	A13	7.1	34.4	10.7	1.1	.6	46.8	------	------	44.3	------	------	------	------
		30–39	A14	7.5	33.5	10.1	1.5	.6	45.7	------	------	43.4	------	------	------	------
		39–53	AC	7.7	32.2	10.5	1.6	.7	45.0	------	------	42.2	------	------	------	------
		53–68+	C	8.0	30.1	10.1	1.9	.6	42.7	------	------	38.8	------	------	------	------
Gloria sandy loam.	16	0–8	Ap1	5.9	3.1	1.7	.3	.5	5.6	------	------	7.0	------	------	------	------
		8–15	A12	7.0	4.0	2.4	.5	.2	7.1	3.5	------	9.0	------	------	------	------
		15–16	A2	7.1	3.4	2.7	.9	.1	7.1	------	10.6	7.8	------	------	------	------
		16–23	B2t	7.7	9.3	9.7	2.7	.4	22.1	------	25.8	23.4	------	------	------	------
		[7] 23–32	[8] B31sim-1	9.0	7.5	6.5	2.2	.3	16.5	------	17.6	15.4	0.5	0.5	7.6	([4])
		[7] 32–41	[8] B31sim-2	9.0	6.5	6.3	2.4	.3	15.5	------	16.2	14.2	------	------	------	------
		[7] 41–57	[8] B32sim-1	8.6	4.5	4.4	1.8	.3	11.0	------	13.2	10.1	------	------	------	------
		[7] 57–68	[8] B32sim-2	8.4	3.3	2.8	1.3	.2	7.6	------	------	7.4	------	------	------	------
		[7] 68–69+	[8] B32sim-3	------	------	------	------	------	------	------	------	------	------	------	------	------
		0–14	[10] B31sim	------	------	------	------	------	------	------	------	------	------	------	------	------
		14–27	[10] B32sim	------	------	------	------	------	------	------	------	------	------	------	------	------
		27–80	[10] C1	6.1	12.0	11.4	3.8	1.2	28.4	------	------	11.4	242.0	231.7	99.0	11.0
Linne silty clay loam.	4	0–4	A11	6.9	39.6	4.8	.2	.9	------	------	------	35.5	------	------	------	------
		4–16	A12	8.2	40.4	4.0	.2	.4	------	------	------	32.4	------	------	------	------
		16–32	A13	8.0	39.1	4.6	.5	.4	------	------	------	31.5	------	------	------	------
		[11] 32–36	A14ca	8.0	35.4	6.2	2.0	.3	------	------	------	29.6	8.2	2.0	10.6	.1
		[11] 36–45	C1	8.5	28.3	4.4	3.0	.2	------	------	------	20.2	13.2	6.7	24.3	.1
		45–60	C2	8.3	25.1	6.6	4.4	.2	------	------	------	20.3	20.1	9.8	39.8	.1
		45–60	[12] Shale	8.0	------	------	------	------	------	------	------	------	------	------	------	------
Lockwood shaly loam.[13]	1	0–3	Ap1	4.9	13.2	4.0	.5	1.4	19.1	------	------	20.7	------	------	------	------
		3–16	Ap2	5.5	12.3	4.8	.7	1.4	19.2	------	------	18.8	------	------	------	------
		16–26	A13	6.8	12.5	4.6	.8	1.0	18.9	------	------	17.8	------	------	------	------
		26–40	B1	7.2	11.8	4.8	1.1	.5	18.2	------	------	17.8	------	------	------	------
		40–57	B21t	7.0	10.7	5.7	1.9	.3	18.6	------	------	18.4	------	------	------	------
		57–82	B22t	6.9	11.2	7.5	2.8	.4	21.9	------	------	23.3	------	------	------	------
		82+	IIC	6.8	12.0	7.5	1.9	.3	21.7	------	------	22.0	------	------	------	------
Placentia sandy loam.	14	0–5	Ap1	6.2	4.4	2.5	.4	.4	7.7	4.4	------	10.0	------	------	------	------
		5–12½	[14] Ap2	5.9	4.8	2.4	.4	.2	7.8	4.1	------	10.8	------	------	------	------
		12½–20	B21t	7.6	12.8	13.7	5.5	.3	22.3	3.1	36.3	32.5	------	------	------	------
		20–29	B22t	8.5	18.8	12.4	5.7	.2	37.1	------	30.4	------	1.6	2.1	24.6	.1
		29–36	B23tca	8.4	13.9	11.1	7.2	.2	32.4	------	27.5	25.8	1.8	3.4	26.5	.1
		36–42	B24t	8.4	7.0	8.7	6.0	.2	21.9	------	22.6	19.5	2.5	2.7	41.1	.1
		42–58	B3t	8.1	4.1	4.9	4.2	.2	13.4	------	14.3	11.4	3.7	5.9	51.5	.1
		58–68	[16] C	7.7	3.3	3.9	3.5	.1	10.8	------	12.0	9.1	4.4	6.6	51.2	.2
		------	Auger	7.2	5.4	5.8	4.7	.2	16.1	------	------	14.3	8.2	11.6	61.2	.2

See footnotes at end of table.

analysis, Part II

Soil Conservation Service, Riverside, California]

Water extracted from saturated paste—Con.				Electrical conductivity	Water at saturation	Exchangeable Na		Base saturation SCl NH_4-OAc	Atterberg limits of less than 0.4 millimeter fraction			Ratios to clay			Clay mineralogy of less than 0.002 millimeter fraction [1]		
CO_3	HCO_3	Cl	SO_4			Percent	Amount		Plastic limit	Liquid limit	Plastic index	CEC NH_4-OAc	Extractable iron	15 bar water	Montmorillonitic	Mica	Kaolin
Meq. per liter	*Meq. per liter*	*Meq. per liter*	*Meq. per liter*	*Millimhos per centimeter*	*Percent*		*Meq. per 100 grams*	*Percent*									
—	—	—	—	—	—	—	—	100+	—	—	—	0.78	0.06	0.45	—	4	1
—	—	—	—	—	—	—	—	100+	15	18	3	.74	.06	.45	—	—	—
—	—	—	—	—	—	—	—	100+	15	21	6	.62	.06	.41	1	5	1
—	—	—	—	—	—	—	—	97	—	—	—	.78	.06	.45	—	—	—
—	—	—	—	—	—	—	—	99	16	29	13	.89	.05	.45	4	3	2
—	—	—	—	—	—	—	—	100+	—	—	—	.85	.07	.48	—	—	—
—	—	—	—	—	—	—	—	100	—	—	—	1.02	.09	.58	4	4	2
—	—	—	—	—	—	—	—	100+	—	—	—	—	—	—	(2)	—	(3)
—	—	—	—	—	—	—	—	100+	30	65	35	—	—	—	—	—	—
—	—	—	—	—	—	—	—	100+	—	—	—	—	—	—	(2)	—	(3)
—	—	—	—	—	—	—	—	100+	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	100+	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	5	—	100+	49	73	24	—	—	—	(2)	—	(4)
—	—	—	—	—	—	—	—	80	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	6	—	79	—	—	—	—	—	—	—	(5)	(6)
—	—	—	—	—	—	8	—	91	—	—	—	—	—	—	(4)	(2)	(6)
—	—	—	—	—	—	10	—	94	—	—	—	—	—	—	(3)	(5)	(6)
(9)	3.6	2.7	—	0.9	29.7	11	1.9	100+	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	15	—	100+	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	14	—	100+	—	—	—	—	—	—	(5)	(6)	(6)
—	—	—	—	—	—	18	—	100+	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
(9)	.7	66.0	—	44.6	30.3	7	.8	100+	—	—	—	—	—	—	(6)	(5)	(6)
—	—	—	—	—	—	—	—	100+	—	—	—	1.15	—	.47	5	—	2
—	—	—	—	—	—	—	—	100+	23	42	19	.98	—	.43	—	—	—
—	—	—	—	—	—	—	—	100+	—	—	—	.98	—	.47	—	—	—
0.8	1.8	17.7	0.1	2.32	64.2	5	—	100+	—	—	—	.93	—	.54	—	—	—
1.3	1.4	38.3	.7	4.51	55.7	8	—	100+	—	—	—	1.19	—	.80	—	—	—
(9)	1.3	63.6	3.0	7.00	62.4	10	—	100+	37	41	4	1.35	—	1.20	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	1.14	5	2	2
—	—	—	—	—	—	—	—	92	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	100+	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	100+	26	32	6	—	—	—	—	—	—
—	—	—	—	—	—	6	—	100+	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	10	—	100+	28	40	12	—	—	—	—	—	—
—	—	—	—	—	—	12	—	94	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	9	—	99	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	77	16	19	3	—	—	—	—	(2)	(6)
—	—	—	—	—	—	—	—	72	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	15	—	69	—	—	—	—	—	—	—	—	—
(9)	2.3	22.7	1.3	3.04	55.9	14	4.4	100+	25	58	33	—	—	—	(2)	(6)	(3)
(9)	2.4	31.0	1.3	3.92	48.0	21	5.9	100+	—	—	—	—	—	—	—	—	—
.5	1.7	40.8	.9	4.69	41.0	19	4.4	100+	—	—	—	—	—	—	—	—	—
(9)	1.3	55.1	.7	6.17	28.7	19	2.7	100+	—	—	—	—	—	—	—	—	—
(9)	.9	57.9	.4	6.85	26.8	18	2.1	100+	—	—	—	—	—	—	—	—	—
(9)	.7	78.0	.1	8.33	31.6	18	2.6	100+	—	—	—	—	—	—	(5)	(5)	(3)

TABLE 16.—*Laboratory*

Soil	Sample number S65 Calif–27–	Depth	Horizon	Reaction in 1:1 soil–water suspension	Extractable bases: Ca	Extractable bases: Mg	Extractable bases: Na	Extractable bases: K	Extractable bases: Sum of bases	Extractable acidity	Cation exchange capacity: Na-OAc	Cation exchange capacity: NH_4-OAc	Water extracted from saturated paste: Ca	Water extracted from saturated paste: Mg	Water extracted from saturated paste: Na	Water extracted from saturated paste: K
		Inches		*pH*	*Meq. per 100 grams of soil*	*Meq. per 100 grams of soil*	*Meq. per 100 grams of soil*	*Meq. per 100 grams of soil*	*Meq. per 100 grams of soil*	*Meq. per 100 grams of soil*	*Meq. per 100 grams of soil*	*Meq. per 100 grams of soil*	*Meq. per liter*	*Meq. per liter*	*Meq. per liter*	*Meq. per liter*
Salinas clay loam.	11	0–5	Ap1	7.8	17.3	7.7	1.5	1.4	27.9	------	------	24.5	([16])	([16])	([16])	([16])
		5–13	Ap2	7.8	17.4	7.7	1.4	1.4	27.9	------	------	25.5	------	------	------	------
		13–23	A13	7.7	18.7	9.0	1.8	.8	30.3	------	------	28.4	------	------	------	------
		23–33	A14	7.8	16.0	7.7	1.6	.5	25.8	------	------	24.9	------	------	------	------
		33–40	C1	8.0	10.2	4.9	4.0	.8	19.9	------	18.2	------	2.2	1.6	6.4	0.2
		40–49	C2	8.3	14.3	4.0	.9	.3	19.5	------	------	11.7	------	------	------	------
		49–75+	C3	8.3	18.7	4.6	.9	.1	24.3	------	------	12.3	------	------	------	------
Shedd silty clay loam.	8	0–5	A11	7.8	46.5	6.3	.3	.6	53.7	------	------	43.1	6.7	1.3	1.5	.2
		5–12	A12	8.0	46.8	7.1	.4	.4	54.7	------	------	42.4	4.0	.9	1.6	.1
		12–23	A13	8.0	44.9	7.9	.4	.4	53.6	------	------	38.0	3.6	1.3	1.6	.1
		[11] 23–30	C1ca	8.0	44.8	9.3	.8	.3	55.2	------	------	39.9	3.8	1.2	2.7	.1
		[11] 30–50	C2	7.9	38.6	12.6	4.0	.6	55.8	------	------	43.0	6.7	2.9	12.7	.2
		50–67+	C2	7.8	32.8	13.4	4.6	.7	51.5	------	------	48.2	7.3	3.9	18.4	.2
		50–67+	[19] C2	7.7	------	------	------	------	------	------	------	43.6	------	------	------	------
Sheridan coarse sandy loam.	24	0–8	A11	6.4	9.4	1.7	.3	.2	11.6	------	------	12.7	------	------	------	------
		8–18	A12	6.4	10.4	2.1	.4	.1	13.0	------	------	13.7	------	------	------	------
		18–28	A13	6.5	13.1	3.0	.4	.1	16.6	------	------	16.9	------	------	------	------
		28–39	A14	6.6	14.2	3.8	.5	.1	18.6	------	------	18.0	------	------	------	------
		39–43	C1	6.5	6.4	1.9	.4	.1	8.8	------	------	8.1	------	------	------	------
		43–57+	C2	6.5	5.0	1.4	.4	.1	6.9	------	------	5.8	------	------	------	------

[1] Approximate weight fraction (X-ray): 5 = more than half; 4 = one-third to half; 3 = one-fifth to one-third; 2 = one-twentieth to one-fifth; and 1 = less than one-twentieth.
[2] Dominant.
[3] Small.
[4] Trace.
[5] Abundant.
[6] Moderate.
[7] These horizons were combined in the profile description to be 23–41 inches and 41–69 inches.
[8] The B31sim and B32sim horizons were sub-sampled.
[9] Looked for but not found.
[10] The lower part of the profile was described and sampled in a road cut 30 yards east of the pit.

have rolling or south-facing slopes have mostly annual grasses and forbs. In many places within this range, the accompanying north-facing sites support an oak-grass cover, and the wind-whipped west-facing spurs are dominated by brush.

Upland areas of clays and clay loams commonly support bur clover.

Geology

The geology of Monterey County is complex. The Santa Lucia Mountains included large masses of granitic and metamorphic rocks in the northern part, diatomaceous shale and massive sandstone in the central part, and fractured sandstone, shale, and masses of serpentine in the southern part. The Gabilan Range consists chiefly of granitic rocks in the northern part, volcanic intrusions in the Pinnacles area, and calcareous shale further south. Large ultra-basic, or serpentinitic, masses parallel the San Benito County and Fresno County lines from Lewis Creek southward. The low, rolling hills in the Prunedale area consist of weakly consolidated sandstone.

North of Salinas a part of the Gabilan Range consists of dolomite and limestone, which are used by local fertilizer and glass manufacturers and in the processing of sugar beets. Beach deposits from Pacific Grove northward yield sand which, because of a high feldspar content, is used in glass and ceramic manufacturing (*7*). Elsewhere, chiefly along the Salinas River and the Arroyo Seco, sand and gravel are extracted for paving and construction. The San Ardo area yields oil and gas.

Relief

The Salinas Valley is the central and most important physiographic feature of Monterey County. This valley

analysis, Part II—Continued

Water extracted from saturated paste—Con.				Electrical conductivity	Water at saturation	Exchangeable Na		Base saturation SC1 NH_4-OAc	Atterberg limits of less than 0.4 millimeter fraction			Ratios to clay			Clay mineralogy of less than 0.002 millimeter fraction [1]		
CO_3	HCO_3	Cl	SO_4			Percent	Amount		Plastic limit	Liquid limit	Plastic index	CEC NH_4-OAc	Extractable iron	15 bar water	Montmorillonitic	Mica	Kaolin
Meq. per liter	*Meq. per liter*	*Meq. per liter*	*Meq. per liter*	*Millimhos per centimeter*	*Percent*		*Meq. per*	*Percent*									
(16)	(16)	(18)	(16)	(16)	(16)	6	----	100+	----	----	----	----	----	----	(17)	----	----
----	----	----	----	----	----	5	----	100+	19	33	14	----	----	----	----	----	----
----	----	----	----	----	----	6	----	100+	----	----	----	----	----	----	----	----	----
----	----	----	----	----	----	6	----	100+	----	----	----	----	----	----	----	----	----
0.2	2.6	1.5	----	1.06	37.4	21	3.2	100+	----	----	----	----	----	----	----	----	----
----	----	----	----	----	----	8	----	100+	----	----	----	----	----	----	----	----	----
----	----	----	----	----	----	7	----	100+	----	(9)	(18)	----	----	----	----	----	----
.8	5.5	1.5	----	.81	66.0	----	.2	100+	----	----	----	----	----	----	(2)	----	(4)
(9)	4.0	1.2	----	.56	65.6	----	.3	100+	----	----	----	----	----	----	----	----	----
(9)	3.6	1.1	----	.57	68.8	----	.3	100+	37	52	15	----	----	----	----	----	----
(9)	2.9	3.4	----	.76	71.8	----	.6	100+	----	----	----	----	----	----	----	----	----
(9)	2.4	17.5	0.9	2.33	102.0	6	2.7	100+	----	----	----	----	----	----	----	----	----
(9)	1.6	24.0	1.1	3.03	100.0	6	2.8	100+	48	81	33	----	----	----	(2)	----	(4)
----	----	----	----	----	----	----	----	91	----	----	----	----	----	----	----	----	----
----	----	----	----	----	----	----	----	95	----	----	----	----	----	----	----	----	----
----	----	----	----	----	----	----	----	98	----	----	----	----	----	----	----	----	----
----	----	----	----	----	----	----	----	100+	----	----	----	----	----	----	----	----	----
----	----	----	----	----	----	5	----	100+	----	----	----	----	----	----	----	----	----
----	----	----	----	----	----	7	----	100+	----	----	----	----	----	----	----	----	----

[11] These horizons were combined in the profile description.
[12] Sample of C2 from which carbonate coatings were removed.
[13] Another profile near this site was analyzed and found to have moderate amounts of amorphous clays in all horizons.
[14] The A2 horizon (12.5–13") was not sampled.
[15] Auger sample from below base of pit.
[16] Additional data is available for a similar soil given in Soil Survey Investigations Report No. 24, SCS, USDA, June 1973, for California.
[17] Data from a similar soil indicates the dominant clay mineral is montmorillonite.
[18] Nonplastic.
[19] C2 horizon material (shale) from which lime coatings were removed.

is about 84 miles long and ranges in width from less than 1 mile at Bradley to 10 to 12 miles in the Salinas area. The elevation at Bradley is 540 feet above sea level, at King City, 332 feet, at Salinas, 50 feet, and at Castroville, 10 feet. The Salinas Valley trends northwest-southeast and lies between the Gabilan Range on the east and the Sierra de Salinas on the west as far as the Arroyo Seco. The Sierra de Salinas is the eastern ridge of a broader mountain system known as the Santa Lucia Range, which lies between the Salinas Valley and the Pacific Coast.

The Santa Lucia Range is moist, rugged, and rises abruptly from the Pacific Ocean to the highest point, Junipero Peak, at 5,844 feet.

The Arroyo Seco flows east from the Sierra de Salinas into the Salinas River northwest of Greenfield. From this point to Castroville, the streams entering the valley on the west side of the Salinas Valley are short and carry a small sediment load. The streams entering the Salinas Valley on the east side are larger, longer, and form many alluvial fans that have forced the Salinas River to the west side of the valley.

The Carmel and Sur Rivers flow from the Santa Lucia Mountains to the Pacific Ocean. In the southwestern part of Monterey County, the San Antonio and Nacimiento Rivers flow across the Santa Lucia Range in a southeasterly direction, then turn to the east and flow into the Salinas River.

Peach Tree Valley, which includes San Lorenzo Creek, is in the southeastern part of the county. Peach Tree Valley trends northwest-southeast, with the San Andreas Fault somewhat parallel and 2 to 3 miles east of the valley. Mustang Ridge lies between Peach Tree Valley and the San Andreas Fault.

The northern boundary of Monterey County is in the Pajaro Valley. The area just south of Pajaro Valley consists of rolling hills and marine terraces along the ocean.

Transportation

In 1872 the Southern Pacific Railroad extended southward from San Jose to Soledad. Later the line was extended, and Salinas is now on the main line between San Francisco and Los Angeles. Spreckles, Monterey, and several other northern points in the county are connected by branch lines.

U.S. Highway 101 traverses the length of the county inland, and State Highway 1 is a scenic coastal highway. Many other paved, two-lane state and county roads serve the flat, more populated parts of the county. Much of the mountain land is not accessible in wet weather unless off-the-road vehicles are used. No motor trails are permitted in the Ventana Wilderness.

Commercial airlines use the 6,600 foot airstrip at Monterey Airport. Salinas, Carmel Valley, and King City also have airports.

Education

Elementary schools and high schools serve all parts of the county. These schools provide bus transportation for students in the area. Hartnell Junior College in Salinas is the second oldest junior college in California. Monterey Peninsula College is another two-year college. The University of California at Santa Cruz is nearby. Special college facilities within the county include the California State College Station at Moss Landing, the Hopkins Station of Stanford University at Pacific Grove, and the Sierra Pine School in Salinas.

Water Supply

Because summers are long and dry, irrigation is required for most crops grown in the area. All specialty crops, such as vegetables, sugar beets, and grapes, need irrigation from May through October. Seven percent of the irrigated acreage accounts for 85 percent of the agricultural income.

The Salinas River and its tributaries are the major source of water for the county. In 1970 there were 180,000 acres irrigated in Monterey County, mostly in the Salinas Valley (*22*). Almost all of the irrigation water in the Salinas Valley is pumped from wells.

The Salinas River is the largest submerged, or "upside-down," river in America. It is underlain by large reservoirs, in which much water is stored. The rapid absorption rate into this underground reservoir accounts for the large volume of water that can be pumped from the Salinas Valley without the water table dropping drastically. It is estimated that above Spreckles the mean annual absorption rate is 162,400 acre feet.

In 1956 the Nacimiento Dam was completed on the Nacimiento River; then, in 1965 the San Antonio Dam was completed on the San Antonio River. The reservoirs have a storage capacity of 350,000 acre feet each (*10*). In addition to giving flood protection, they supply Monterey County with a total of 99,500 acre feet of water during the summer. This water is released into the Salinas River and maintains a flow to the Spreckles area. This extra water is needed because sprinkler irrigation has made it possible to bring more land under irrigation. The control of the Salinas River has also allowed farming to move closer to the river channel.

The Castroville area has a problem with salt water intrusion in the underground water supply. Water needs to be moved to Castroville for irrigation, possibly from Nacimiento and San Antonio Lakes. The infiltration of fresh water into the ground water would result in a net decrease in the withdrawal of ground water and should solve the salt water intrusion problem.

The Carmel and Sur Rivers drain into the northern part of the Santa Lucia Mountains. At the present time no extensive use is made of this water.

Trends in Soil Uses

Sebastian Viscaino landed near Monterey in 1602. His enthusiastic report encouraged Father Serra to establish a mission in the area in 1770. Mission San Carlos Borromeo, second in the series of California missions, was followed by the Soledad and San Antonio Missions. The mission Padres considered an improvement of the Indians' physical lot to be a prerequisite to any lasting spiritual growth. Farming was the chief means for accomplishing that end (*19*).

Mission livestock roamed widely over the better lands. Stock from the San Carlos Mission ranged from far up Carmel Valley into the Salinas Valley, from Chualar far down toward the river's mouth, which before the 1906 earthquake was in the vicinity of Elkhorn Slough (*16*). Tallow and hide shipments provided the base for mission wealth.

In 1824, title to California passed from Spain to Mexico. In 1833 the missions were secularized, and the land was held by private ranchers. During the Mexican period, 32 land grants were awarded, eight in excess of 10,000 acres (*16*). Much later settlements gradually filled in the land as these Mexican grants were broken up.

An unusual settlement is the one at Fort Romie, near Soledad, which was made up of relatively small farms. In 1898 this venture failed because of drought and the lack of farming experience of the first settlers. These small land parcels were then sold to Swiss farmers who implemented dairy farming by using beet tops and sugar beet pulp from the then new Spreckles factory.

Another settlement was at what came to be called Clark Colony, near Arroyo Seco. Here, soon after the turn of the century, 4,000 acres were sold in 20-acre tracts at $20.00 per acre. Drifting sands proved troublesome, but this challenge was met when the settlers obtained water rights to 218 square miles of watershed and built a canal on the Arroyo Seco. Water became available at a dollar an acre, and soon farms were thriving and the town of Greenfield came into being (*16*).

In other parts of the county, wheat and barley production was stimulated by the selling or breaking up of the land grants into smaller holdings, but as late as 1856, less than 5,500 acres were reported under cultivation. Extension of the railroad south to Soledad in 1872 and southward toward San Ardo in the 1880's encouraged a further shift from sheep to grain. The

1880 census reported wheat on 69,000 acres. During the 1880's, acreage shifted from wheat to barley, and by 1972 grain seedings in Monterey County included 55,000 acres of barley but only 6,500 acres of wheat (*24*).

As in other parts of the Central Coast, expansion of the livestock industry in Monterey County in the decade following the gold rush resulted in disastrous losses during the drought of 1862–1864. The cattle population dwindled from 90,000 in 1862 to 14,000 in 1865 (*19*). In recent years cattle and calf numbers have again reached or approached 90,000. An intensive feeder operation has also developed, with 100,000 feeders in 1967 and 200,000 in 1972 (*24*). However, by 1975 the number of feeders again was beginning to decline.

The trend in sheep numbers has been essentially the opposite. In 1872 Monterey County, then ranked among the top four counties in the state, had 263,000 sheep, but by 1972 it had less than 29,000 (*24*). The extension of the railroad southward is a factor in the shift from sheep to grain.

Dairying began in Monterey County in about 1862 when a herd of 500 cows was established near Spreckles. Low-lying land at the end of the Salinas Valley supported large quantities of lush feed, and a thriving dairy industry developed, with Monterey Jack cheese as one of the products. In 1924, with more than 25,000 dairy cows in the county, dairying was reported as the most important industry in the Salinas Valley. During and immediately after World War II, dairying decreased drastically, and by 1951 the county had only 1,400 dairy animals (*24*). Rather than undergo the expense of qualifying for Grade-A milk production, some dairymen chose to shift to vegetable production.

Sugar beets, the first major cash crop to be irrigated, were introduced into the Salinas Valley in about 1885. Tariff legislation of 1894 and 1897 encouraged local sugar production, and in 1897 a factory was built at Spreckles which replaced one in the Pajaro Valley. The Spreckles factory became the largest sugar beet refinery in the world, processing more than 3,500 tons of beets per day (*16*). For some years sugar prices fluctuated widely, discouraging plantings, but legislation passed during the 1930's tended to stabilize the sugar market. Accordingly the acreage devoted to sugar beets has remained relatively stable, at about 20,000 acres.

In 1916 the first wagonload of lettuce was shipped from the Pajaro Valley to San Francisco. By 1931, after the development of improved methods of refrigeration, Monterey County lettuce production rose dramatically to 20,000 freight cars per year (*16*). Plantings generally fluctuate between about 47,000 to 55,000 acres, far more acreage than any other irrigated crop in the county. In large measure, Monterey County's rank as the leading California county in vegetable production is due to its lettuce fields. In some weeks 90 percent or more of the nation's iceberg lettuce comes from shipments originating in the Salinas area.

Cole crops (Crucfers), as a group, are increasing within the county. In part this reflects advances in freezing technology, changes in consumer eating habits, loss of cauliflower fields because of urbanization in the Santa Clara Valley, and the development of varieties that can withstand more heat during their growth. Cauliflower plantings increased from 300 acres in 1951 to 3,700 acres in 1961 and to 9,400 acres in 1971. Broccoli followed a similar trend, increasing from 6,000 acres in 1951 to 24,000 acres in 1971 (*24*).

The surge in celery production, increasing from 1,500 acres in 1951 to 5,000 acres in 1961, has been attributed to the discovery that superior quality stalks could be grown in a longer harvest season. This led to a shift in production from the San Joaquin delta to the Salinas area.

In 1920 the largest single planting of strawberries west of the Mississippi, covering 100 acres, bordered Gabilan Creek near Salinas. However, the acreage remained relatively low until 1950, when there were about 500 acres of strawberries. During the next decade, acreage rose steadily to a high of 6,800 acres in 1957. Low prices in 1958 triggered a downward trend, a trend accelerated after 1964 by instabilities in the labor scene. Although acreage has declined drastically, production has remained high because of increased yields attributable to improved technology and to intensive care by operators of small holdings (*17*).

Castroville produces more than 90 percent of the nation's artichokes. In recent years some bottom land in the lower Carmel Valley has changed from artichoke production to urban uses. Other more rolling land nearer Castroville has shifted from pasture to artichokes.

Dry beans, tomatoes, dry onions, and grapes are some crops which more or less center in the King City area. The census for 1900 reported 466 acres of beans in Monterey County, mainly small white beans grown without irrigation in the King City area. Bean acreage expanded to more than 55,000 acres in 1937, but after World War II it declined. During the 1950's some sprinkler irrigation was used and bean acreage shifted from some of the lower lands, which went into vegetables, to areas which formerly had been dryfarmed for grain. A more general decline in bean plantings began in about 1960, and considerable acreage has shifted in recent years to grapes.

Decline in tomato acreage is attributed in part to quotas set by processors. In recent years more tomatoes have been produced on fewer acres. Plantings have declined from 8,500 acres in 1961 to less than 5,000 acres in 1971 and 1972.

In 1972 there were about 14,000 acres planted to grapes, of which 2,500 acres were of bearing age. Another 14,000 acres were scheduled for planting in 1973. Most of this acreage is in the Salinas Valley from south of Chualar to San Ardo. The soils planted to grapes generally are sloping rather than nearly level (*24*).

The most important industry in Monterey County is food processing. Large quantities of vegetables are processed and frozen for shipment throughout the United States. There are also several canning industries in the area. There is a large sugar beet refinery at Spreckles. The wine industry is growing rapidly. Industries allied with food processing include container manufacturing, waxed paper, string, chemicals, and commercial ice. Many companies sell and service farm machinery. There are livestock sales yards and meat packing plants in the area.

Climate [8]

Monterey County is favored with a generally mild climate. Temperatures near the coast are uniform throughout the year, but the range widens as distance from the water increases. At inland locations, summers are warm to hot and winters have minimum readings well below freezing.

The growing season is as short as 150 days in some mountain areas, but ranges from 200 days to more than 350 days in most areas where cultivated crops are grown.

Precipitation is concentrated in winter. Totals range from about 10 inches in drier locations to near or slightly above 80 inches in the coastal mountains. Snowfall in the county is generally insignificant, although a limited amount is received each winter at the higher elevations.

Evaporation is moderate along the coast and fairly high inland. Relative humidity is generally moderate, but low readings occur in inland areas in summer and fall.

Abundant sunshine is characteristic of the inland area, but coastal areas and the coastal end of the Salinas Valley are subject to considerable cloudiness in summer. Much of this cloudiness, however, occurs during night and morning hours.

Winds are mostly less than 10 to 15 miles per hour, though stronger winds are common to some areas along the coast. Winter storms produce some damaging winds, particularly in open areas and at higher elevations.

Effect of terrain on climate.—The climate of Monterey County is strongly affected by the proximity of the Pacific Ocean. Its moderating influence limits the diurnal and annual range of temperature, keeping summers cool and winters moderately warm close to the water. It is also very cloudy near the beach in summer, especially during the evening, night, and morning. Nighttime cloudiness is common throughout the Salinas Valley during much of the summer; however, as the distance from the ocean increases, the clouds are fewer, and they form later in the evening and clear earlier in the morning.

Inland, the pattern of climate becomes more complex as the maritime influence interacts with mountain barriers and inland heating. The coastal mountains in the central and southern parts of the county hold marine air away from the interior, but as the sun heats the middle and southern parts of the Salinas Valley and higher elevations near the adjacent mountains, rising warm air draws cooler marine air from Monterey Bay into the valley. This circulation is also facilitated by the valley's northwest-southeast orientation and the mainly west and northwest summer wind pattern. As a result of this sequence of heating and cooling, daily and yearly temperatures in the county's interior range widely. These wide temperature ranges are also characteristic of both the middle and upper parts of the Salinas Valley and the middle slopes of the adjacent ranges.

The higher mountains are above the layer of marine air much of the time and are characterized by abundant sunshine in summer. Due to the effect of elevation and rapid radiation, however, temperature ranges are also wide here, as they are in the valley.

Little moisture is received in summer, but November through April is usually wet. The abrupt lifting of moist air as it rises to cross the Santa Lucia Mountains creates a band of heavy precipitation within a few miles of the coast. Conversely, the descending, drying air on the east side of the range brings only light rain to much of the Salinas Valley.

Temperature.—The average annual temperature is about 55° F along the coast and in the mountains along the eastern boundary. Annual temperatures of about 60° are characteristic of the interior valley.

On a typical summer day along the coast, the range in temperature is very limited. Inland the range is greater because temperatures climb fairly high before the sea breeze becomes effective. Occasionally an offshore flow of air permits daytime temperatures to climb unseasonably high both inland and near the coast. Under these circumstances temperatures remain warm through the night, and the diurnal range is rather limited in spite of the high daytime readings.

In summer the average daily maximum temperature remains in the low 60s along the coast and ranges from the middle 80s to the middle 90s in the valley and the eastern mountain area. Extreme high temperatures exceed 100° F at all points except along the immediate coast, and readings of 115° or warmer have been made in the upper Salinas and San Antonio Valleys. Minimum temperatures in summer are near 50° in most of the county.

Winter brings frequent, widespread cloudiness and occasional rain, resulting in a smaller range in temperatures and less variation between coastal and inland points. Low temperatures average in the middle or low 30s through the valleys and drop to near 20° in the eastern mountains. Along the coast and in the mountains of the western part of the county, minimum temperatures average in the low or middle 40s. Extreme low temperatures of below freezing have occurred at all reporting points, into the middle teens in the valleys, and down to 5° at points in the eastern mountains. Even in winter, however, daytime temperatures are moderate; average temperatures are in the high 50s and low 60s in most areas and in the middle 60s in the east.

Freeze data.—Monterey County generally experiences a long growing season. Based on 32° F temperature readings, the frost-free season is 350 days or more along the coast, 200 to 250 days in the valleys, and about 150 days in the mountains. The last freeze in spring averages earlier than January 1 along the coast, during March in the valleys, and as late as May in the mountains. In fall the average earliest freeze is in October in the mountains, November in the valleys, and later than December 31 along the coast.

Based on readings of 28°, the growing season is 200 days in the mountains, 250 to 300 days in the valley, and more than 350 days along the coast.

Precipitation.—Precipitation, mostly rain, occurs chiefly in winter. As a result of terrain and the maritime influence, the amount of precipitation varies con-

[8] By ROBERT ELFORD, former climatologist for California, National Weather Service, U.S. Department of Commerce.

siderably from point to point. In most areas of the Santa Lucia Mountains, the annual amount averages more than 20 inches, and it is about 80 inches at some higher elevations. Most of the Salinas and San Antonio Valleys are in the rain shadow of the Santa Lucia Mountains, and the annual total precipitation drops to about 10 inches in the King City-Soledad area. Further east, amounts increase again on the western slopes of the Gabilan and Diablo Ranges, and about 20 inches are reported at some of the higher elevations.

Precipitation varies considerably from year to year. In the driest year in 20, the annual total precipitation in the Santa Lucia Mountains is as little as 40 inches; parts of the central and upper Salinas Valley receive less than 5 inches; and the eastern mountains receive about 10 inches. In the wettest year in 20, precipitation increases to about 130 inches in the Santa Lucia Mountains, 15 to 20 inches in the Salinas Valley, and 30 to 35 inches in the eastern mountains.

Even in the areas of heavy precipitation, the number of days of rain is relatively small. Along the coast 50 to 55 days a year receive measurable amounts of rain, 35 to 45 days receive 0.10 inch or more, and 15 to 25 receive 0.50 inch or more. In the Salinas Valley 30 to 35 days receive measurable amounts, 20 to 25 receive 0.10 inch, and 5 to 10 receive 0.50 inch. The eastern mountains have measurable precipitation on about 50 days, 0.10 inch on about 30 days, and 0.50 on 10 to 15 days.

Snowfall.—Snow is not a significant factor in the climate of Monterey County. Snowfall is infrequent at most lower elevations. It usually melts as it falls, although it will occasionally remain on the ground for a few hours. In the mountains snowfall occurs in most years, but the average seasonal snowfall does not exceed 3 inches at any reporting location. However, forest rangers report that on the higher peaks snowfall averages 18 to 20 inches per year and usually covers the ground for 7 to 10 days. It is not uncommon for snow to reach a depth of 20 to 30 inches and to last for 2 to 3 weeks on south-facing slopes and even longer on north-facing slopes.

Evapotranspiration.—Evapotranspiration refers to the total transfer of moisture from the soil to the air in a field growing a well established crop. Some of the water loss is by evaporation from the surface of the soil; other moisture is carried upward and evaporated from the leaves and other surfaces of the plants.

Potential evapotranspiration (PET) is defined as the amount of moisture that is lost to the soil by evaporation and transpiration under existing temperatures with an adequate supply of available moisture. The potential evapotranspiration over a period of a year averages 25 to 27 inches of moisture along the coast and in the mountains and about 30 inches in the valleys. The amount of moisture lost during the 32° F growing season is still 25 to 27 inches along the coast but drops to 25 to 27 inches in the valleys and to 15 to 20 inches in the eastern mountains.

The actual evapotranspiration (Ea) is defined as the computed amount of water loss under existing temperature and precipitation conditions. This is equivalent to the amount of water lost in dryfarming. For these computations, it is assumed that the soil in the root zone is capable of storing 4 inches of plant-available moisture; available moisture in excess of this is assumed to run off or to percolate beyond the reach of plant roots. It is further assumed that plants use soil moisture at the full, or potential, rate until all stored moisture has been used. This simplification may not always be the case in nature.

On the basis of these assumptions, the annual actual evapotranspiration is about 15 inches along the coast and 10 to 12 inches in the valley and in the mountains. The amount during the 32° growing season is still 15 inches along the coast but drops to 5 to 8 inches in the valley and to 3 inches in the eastern mountains.

It is possible to extend these computations to estimate the average date when soil moisture reserves are exhausted in an average year. This is the date when range grasses stop growing. Indications are that this dry date occurs late in May in the valleys and during mid-June along the coast and in the mountains.

Relative humidity.—Humidity remains moderate to high along the coast throughout the year, but occasionally an offshore flow of air drops readings to low levels. Inland, humidities are moderate in winter and drop to low levels in summer and fall. The Salinas Valley is subject to wide variations in humidity, because the influx of marine air brings high readings and daytime heating and mixing drops readings to low levels. There are usually a few days each year when winds from the north or east create unusually low humidities and the danger of fire is high.

Sunshine and cloudiness.—Sunshine is least in winter and greatest in summer and fall. The area receives an estimated 160 to 180 hours of sunshine during January, or about 60 percent of the possible hours. In July the sunshine totals about 320 hours along the coast and 380 hours inland, or 75 percent to 85 percent of the possible hours. For the year as a whole, the county receives from 3,000 to 3,300 hours of sunshine, an average of 70 to 72 percent of the possible hours.

Special studies show that dense fog occurs more than 25 percent of the time at Point Piedras Blancas in July, but drops to 10 percent for the year as a whole. At Monterey, light, moderate, or dense fog is reported 14 percent of the time in August but only 7 percent of the time during the entire year. Dense fog occurs up to 5 percent of the time in September. Further inland, at Salinas, light, moderate, and dense fog occurs 10 percent of the time during August and less than 5 percent of the time during the whole year. Dense fog reaches its maximum during August when it occurs 2.5 percent of the time.

Wind.—In summer there is a persistent inflow of air from the ocean which results from the semipermanent high pressure area over the northeast Pacific Ocean. This air movement tends to be channeled in a northwest-southeast direction because of the orientation of the mountains, the valleys, and the coastline.

Monterey reports wind from the northwest or north about 33 percent of the time, with a secondary maximum from the south quadrant. At Salinas, winds are from the west and northwest approximately 50 percent of the time with a secondary maximum from the southeast. Windspeeds are less than 5 miles per hour 33 percent of the time. At Point Piedras Blancas, northwest winds are reported 52 percent of the time,

with a secondary maximum from the southeast. Speeds are greater here, however, and 23 percent of the readings show windspeeds of 16 miles per hour or higher.

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Glossary

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim. An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single mapping unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	More than 9

Chaparral. A dense community of scrub plants, normally permanent, that is dominated by evergreen shrubs or dwarf trees.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coat, clay skin.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the bases of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures is difficult.

Complex, soil. A mapping unit of two or more kinds of soil occurring in such an intricate pattern that they cannot be shown separately on a soil map at the selected scale of mapping and publication.

Compressible. Excessive decrease in volume of soft soil under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure be-

tween thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Cutbanks cave. Unstable walls of cuts made by earthmoving equipment. The soil sloughs easily.

Depth to rock. Bedrock at a depth that adversely affects the specified use.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, as for example in "hillpeats" and "climatic moors."

Excess fines. Excess silt and clay. The soil does not provide a source of gravel or sand for construction purposes.

Excess lime. Excess carbonates. Excessive carbonates, or lime, restrict the growth of some plants.

Excess salts. Excess water soluble salts. Excessive salts restrict the growth of most plants.

Fast intake. The rapid movement of water into the soil.

Favorable. Favorable soil features for the specified use.

Flooding. The temporary covering of soil with water from overflowing streams, runoff from adjacent slopes, and tides. Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as *none, rare, occasional,* and *frequent. None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May. Water standing for short periods after rainfall or commonly covering swamps and marshes is not considered flooding.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Gleyed soil. A soil having one or more neutral gray horizons as a result of waterlogging and lack of oxygen. The term "gleyed" also designates gray horizons and horizons having yellow and gray mottles as a result of intermittent waterlogging.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

O horizon.—An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon.—The mineral horizon, formed or forming at or near the surface, in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon most of which was originally part of a B horizon.

A2 horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Large stones. Rock fragments 10 inches (25 centimeters) or more across. Large stones adversely affect the specified use.

Low strength. Inadequate strength for supporting loads.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—few, common, and many; size—fine, medium, and coarse; and contrast—faint, distinct, and prominent. The size measurements are of the diameter along the greatest dimension. Fine indicates less than 5 millimeters (about 0.2 inch); medium, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and coarse, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three single variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Percs slowly. The slow movement of water through the soil adversely affecting the specified use.

Permafrost. Layers of soil, or even bedrock, occurring in arctic

or subarctic regions, in which a temperature below freezing has existed continuously for a long time.

Permeability. The quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the soil. Terms describing permeability are very slow (less than 0.06 inch), slow (0.06 to 0.20 inch), moderately slow (0.2 to 0.6 inch), moderate (0.6 to 2.0 inches), moderately rapid (2.0 to 6.0 inches), rapid (6.0 to 20 inches), and very rapid (more than 20 inches).

Phase, soil. A subdivision of a soil series or other unit in the soil classification system based on differences in the soil that affect its management. A soil series, for example, may be divided into phases on the bases of differences in slope, stoniness, thickness, or some other characteristic that affects management. These differences are too small to justify separate series.

Piping. Formation by moving water or subsurface tunnels or pipelike cavities.

Poor outlets. Surface or subsurface drainage outlets difficult or expensive to install.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH		*pH*
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Rill. A steep sided channel resulting from accelerated erosion. A rill is generaly a few inches deep and not wide enough to be an obstacle to farm machinery.

Rooting depth. Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Seepage. The rapid movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils, formed from a particular type of parent material, having horizons that, except for the texture of the A or surface horizon, are similar in all profile characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineralogical and chemical composition.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.02 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slow intake. The slow movement of water into the soil.

Small stones. Rock fragments 3 to 10 inches (7.5 to 25 centimeters) in diameter. Small stones adversely affect the specified use.

Soil. A natural, three-dimensional body at the earth's surface that is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Stone line. A concentration of coarse fragments in soils that generally marks an old weathering surface. In a cross section, the line may be one fragment or more thick. The line generally overlies material that weathered in place and marks the top of a paleosol. It is ordinarily overlain by recent sediment of variable thickness.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are—platy (laminated), prismatic (vertical axis of aggregates longer than horizontal), columnar (prisms with rounded tops), blocky (angular or subangular), and granular. Structureless soils are either single grained (each grain by itself, as in dune sand) or massive (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it can soak into the soil or flow slowly to a prepared outlet without harm. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in a permanent sod.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are sand, loamy sand, sandy loam, loam, silt, silt loam, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer. Otherwise suitable soil material too thin for the specified use.

Type, soil. A subdivision of the soil series that is made on the basis of differences in the texture of the surface layer.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but the limited geographic soil area does not justify creation of a new series.

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.

Water table, apparent. A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table, artesian. A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

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GUIDE TO MAPPING UNITS

Map symbol	Soil name	Described on page	Capability unit	Page	Range site	Page	Storie index
AaC	Alo silty clay, 2 to 9 percent slopes	5	IIIe-5(15)	88	Clayey	109	44
AaD	Alo silty clay, 9 to 15 percent slopes	5	IIIe-5(15)	88	Clayey	109	42
AaE	Alo silty clay, 15 to 30 percent slopes	6	IVe-5(15)	90	Clayey	109	32
AaF	Alo silty clay, 30 to 50 percent slopes	6	VIe-1(15)	91	Clayey	109	20
Ab	Alo-Millsholm complex	6	VIe-1(15)	91	----------	---	1/23
	Alo part	--	----------	--	Clayey	109	-----
	Millsholm part	--	----------	--	Shallow Loamy	113	-----
Ac	Alviso silty clay loam	6	VIIIw-1(15)	92	----------	---	7
Ad	Alviso silty clay loam, drained	7	VIw-1(14)	91	----------	---	24
AeA	Antioch very fine sandy loam, 0 to 2 percent slopes	8	IIIs-3(14)	89	Claypan	110	45
AeC	Antioch very fine sandy loam, 2 to 9 percent slopes	8	IIIe-3(14)	87	Claypan	110	40
AeD	Antioch very fine sandy loam, 9 to 15 percent slopes	8	IVe-3(14)	90	Claypan	110	34
Af	Aquic Xerofluvents	8	IVw-4(15)	90	----------	---	41
AgC	Arbuckle gravelly loam, 2 to 9 percent slopes	9	IIe-4(14), IIIe-4(15)	85, 88	----------	---	65
AgD	Arbuckle gravelly loam, 9 to 15 percent slopes	9	IIIe-4(15)	88	----------	---	61
AkD	Arnold loamy sand, 9 to 15 percent slopes	10	IVe-4(15)	90	Sandy	112	68
AkF	Arnold loamy sand, 15 to 50 percent slopes	10	VIIe-1(15)	91	Sandy	112	27
Am	Arnold-San Andreas complex	10	VIIe-1(15)	91	----------	---	1/9
	Arnold part	--	----------	--	Sandy	112	-----
	San Andreas part	--	----------	--	Coarse Loamy	112	-----
Ar	Arnold-Santa Ynez complex	10	VIe-1(15)	91	----------	---	1/42
	Arnold part	--	----------	--	Sandy	112	-----
	Santa Ynez part	--	----------	--	Claypan	110	-----
AsA	Arroyo Seco gravelly sandy loam, 0 to 2 percent slopes	11	IIIs-4(14)	89	----------	---	63
AsB	Arroyo Seco gravelly sandy loam, 2 to 5 percent slopes	11	IIIe-4(14)	87	----------	---	60
AsC	Arroyo Seco gravelly sandy loam, 5 to 9 percent slopes	11	IIIe-4(15)	88	----------	---	50
AvA	Arroyo Seco gravelly loam, 0 to 2 percent slopes	12	IIs-4(14)	86	----------	---	72
AvB	Arroyo Seco gravelly loam, 2 to 5 percent slopes	12	IIe-4(14)	85	----------	---	72
AyD	Ayar silty clay, 5 to 15 percent slopes	12	IIIe-5(15)	88	Clayey	109	48
AyE	Ayar silty clay, 15 to 30 percent slopes	12	IVe-5(15)	90	Clayey	109	36
AyF	Ayar silty clay, 30 to 50 percent slopes	13	VIe-1(15)	91	Clayey	109	20
Ba	Badland	13	VIIIe-1(15)	92	----------	---	2/<10
BbC	Baywood sand, 2 to 15 percent slopes	13	VIe-1(15)	91	Sandy	112	51
CaD	Chamise shaly loam, 9 to 15 percent slopes	14	IVe-1(15)	89	Terrace	112	28
CaE	Chamise shaly loam, 15 to 30 percent slopes	14	IVe-1(15)	89	Terrace	112	23
CaF	Chamise shaly loam, 30 to 50 percent slopes	14	VIe-1(15)	91	Terrace	112	11
CbA	Chualar loam, 0 to 2 percent slopes	15	I(14), IIIc-1(15)	85, 89	----------	---	85
CbB	Chualar loam, 2 to 5 percent slopes	15	IIe-1(14)	85	----------	---	81
CbC	Chualar loam, 5 to 9 percent slopes	16	IIe-1(14)	85	----------	---	72
CcG	Cieneba fine gravelly sandy loam, 30 to 75 percent slopes	16	VIIe-1(15)	91	Shallow Loamy	113	5
Cd	Cieneba-Rock outcrop complex	16	VIIs-1(15)	92	Shallow Loamy	113	3

Map symbol	Soil name	Described on page	Capability unit	Page	Range site	Page	Storie index
Ce	Cieneba-Sur-Rock outcrop complex	17	VIIIs-1(15)	92	----------	---	1/ 4
Cf	Clear Lake clay	17	IIIw-5(14)	88	----------	---	16
Cg	Clear Lake clay, moderately wet	18	IIw-5(14)	86	----------	---	43
ChE	Climara clay, 15 to 30 percent slopes	18	IVe-5(15)	90	Clayey	109	29
ChF	Climara clay, 30 to 50 percent slopes	18	VIe-1(15)	91	Clayey	109	17
Ck	Climara-Montara complex	19	VIIe-1(15)	91	----------	---	1/ 14
	Climara part	--	----------	--	Clayey	109	-----
	Montara part	--	----------	--	Serpentine	113	-----
Cm	Coastal beaches	19	VIIIw-1(15)	92	----------	---	2/ <10
CnA	Cropley silty clay, 0 to 2 percent slopes	20	IIs-5(14)	86	----------	---	51
CnC	Cropley silty clay, 2 to 9 percent slopes	20	IIe-5(14), IIIe-5(15)	85, 88	----------	---	48
DaA	Danville sandy clay loam, 0 to 2 percent slopes	21	IIs-3(14)	86	----------	---	72
DaC	Danville sandy clay loam, 2 to 9 percent slopes	22	IIe-3(14)	85	----------	---	68
DbD	Diablo clay, 9 to 15 percent slopes	22	IIIe-5(15)	88	Clayey	109	38
DbE	Diablo clay, 15 to 30 percent slopes	22	IVe-5(15)	90	Clayey	109	32
DbF	Diablo clay, 30 to 50 percent slopes	22	VIe-1(15)	91	Clayey	109	18
DcC	Dibble loam, 2 to 9 percent slopes	23	IIIe-3(15)	87	Loamy	110	68
DdB	Dibble silt loam, 9 to 15 percent slopes	23	IIIe-3(15)	87	Loamy	110	57
DdE	Dibble silt loam, 15 to 30 percent slopes	23	IVe-3(15)	90	Loamy	110	46
DdF	Dibble silt loam, 30 to 50 percent slopes	23	VIe-1(15)	91	Loamy	110	28
DeA	Docas silty clay loam, 0 to 2 percent slopes	24	I(14), IIc-1(15)	85, 89	----------	---	90
DeC	Docas silty clay loam, 2 to 9 percent slopes	24	IIe-1(14)	85	----------	---	76
Df	Dune land	24	VIIIe-1(15)	92	----------	---	9
EaA	Elder sandy loam, 0 to 2 percent slopes	25	IIs-4(14)	86	----------	---	95
EbC	Elder very fine sandy loam, 2 to 9 percent slopes	25	IIe-1(14), IIIe-1(15)	85, 87	----------	---	86
EcA	Elder loam, gravelly substratum, 0 to 2 percent slopes	25	IIs-4(14)	86	----------	---	90
EdB	Elkhorn fine sandy loam, 2 to 5 percent slopes	26	IIe-1(14)	85	----------	---	-----
EdC	Elkhorn fine sandy loam, 5 to 9 percent slopes	26	IIe-1(14)	85	----------	---	77
EdD	Elkhorn fine sandy loam, 9 to 15 percent slopes	26	IIIe-1(14)	87	----------	---	73
EeD	Elkhorn fine sandy loam, thin surface variant, 5 to 15 percent slopes	27	IIIe-3(14)	87	----------	---	69
EeE	Elkhorn fine sandy loam, thin surface variant, 15 to 30 percent slopes	27	IVe-3(14)	90	Fine Loamy	109	56
Fa	Fluvents, stony	28	VIIs-1(15)	92	----------	---	2/ <10
Ga	Gamboa-Sur complex	28	VIIIe-1(15)	92	----------	---	1/ 8
GbC	Garey sandy loam, 2 to 9 percent slopes	29	IIe-1(14), IIIe-1(15)	85, 87	Coarse Loamy	112	77
GbE	Garey sandy loam, 9 to 30 percent slopes	29	IVe-1(15)	89	Coarse Loamy	112	69
GbF2	Garey sandy loam, 30 to 50 percent slopes, eroded	29	VIe-1(15)	91	Coarse Loamy	112	34
Gc	Garey-Oceano complex	29	VIIe-1(15)	91	----------	---	1/ 41
	Garey part	--	----------	--	Coarse Loamy	112	-----
	Oceano part	--	----------	--	Sandy	112	-----

Map symbol	Soil name	Described on page	Capability unit	Page	Range site	Page	Storie index
GdE	Gaviota sandy loam, 15 to 30 percent slopes--	30	VIe-1(15)	91	Shallow Coarse Loamy	113	19
GdF	Gaviota sandy loam, 30 to 75 percent slopes--	30	VIIe-1(15)	91	Shallow Coarse Loamy	113	8
GeE	Gaviota-San Andreas complex, 15 to 30 percent slopes----------	30	VIe-1(15)	91	----------	---	1/26
	Gaviota part----------	--	----------	--	Shallow Coarse Loamy	113	-----
	San Andreas part----------	--	----------	--	Coarse Loamy	112	-----
GeG	Gaviota-San Andreas complex, 30 to 75 percent slopes----------	30	VIIe-1(15)	91	----------	---	1/11
	Gaviota part----------	--	----------	--	Shallow Coarse Loamy	113	-----
	San Andreas part----------	--	----------	--	Coarse Loamy	112	-----
GfE	Gazos silt loam, 15 to 30 percent slopes-----	31	IVe-1(15)	89	Fine Loamy	109	38
GfF	Gazos silt loam, 30 to 50 percent slopes-----	31	VIe-1(15)	91	Fine Loamy	109	17
GgE	Gilroy gravelly loam, 15 to 50 percent slopes----------	32	VIIe-1(15)	91	Coarse Loamy	112	16
GgG2	Gilroy gravelly loam, 30 to 75 percent slopes, eroded----------	32	VIIe-1(15)	91	Coarse Loamy	112	8
GhC	Gloria sandy loam, 2 to 9 percent slopes-----	33	IIIe-3(14)	87	Claypan	110	27
GhD	Gloria sandy loam, 9 to 15 percent slopes----	33	IVe-3(14), IVe-3(15)	90	Claypan	110	25
GhF	Gloria sandy loam, 15 to 50 percent slopes---	33	VIIe-1(15)	91	Claypan	110	19
GkB	Gorgonio sandy loam, 0 to 5 percent slopes---	34	IIIs-4(14), IIIs-4(15)	89	----------	---	86
GmB	Greenfield fine sandy loam, 2 to 5 percent slopes----------	35	IIe-1(14)	85	----------	---	92
GmC	Greenfield fine sandy loam, 5 to 9 percent slopes----------	35	IIe-1(14)	85	----------	---	90
GmD	Greenfield fine sandy loam, 9 to 15 percent slopes----------	35	IIIe-1(14)	87	----------	---	81
HaE	Haire loam, 15 to 30 percent slopes----------	36	VIe-1(15)	91	Claypan	110	28
HbB	Hanford gravelly sandy loam, 0 to 5 percent slopes----------	36	IIs-4(14), IIIs-4(15)	86, 89	----------	---	60
HcF	Henneke extremely stony clay loam, 15 to 75 percent slopes----------	37	VIIs-1(15)	92	Serpentine	113	5
JaF	Junipero loamy sand, 30 to 50 percent slopes-	37	VIIe-1(15)	91	Sandy	112	16
JbG	Junipero sandy loam, 30 to 75 percent slopes-	38	VIIe-1(15)	91	Granitic	111	14
Jc	Junipero-Sur complex----------	38	VIIIe-1(15)	92	----------	---	1/7
LaD	Linne silty clay loam, 5 to 15 percent slopes----------	39	IIIe-1(15)	87	Clayey	109	50
LaE	Linne silty clay loam, 15 to 30 percent slopes----------	39	IVe-1(15)	89	Clayey	109	35
LaF	Linne silty clay loam, 30 to 50 percent slopes----------	39	VIe-1(15)	91	Clayey	109	19
LbD	Linne-Diablo complex, 9 to 15 percent slopes----------	39	IIIe-1(15)	87	Clayey	109	1/45
LbE	Linne-Diablo complex, 15 to 30 percent slopes----------	39	IVe-1(15)	89	Clayey	109	1/33

Map symbol	Soil name	Described on page	Capability unit	Page	Range site	Page	Storie index
LcE	Linne-Shedd silty clay loams, 15 to 30 percent slopes	40	IVe-1(15)	89	Clayey	109	1/35
LcF	Linne-Shedd silty clay loams, 30 to 50 percent slopes	40	VIe-1(15)	91	Clayey	109	1/19
LcF2	Linne-Shedd silty clay loams, 15 to 50 percent slopes, eroded	40	VIe-1(15)	91	Clayey	109	1/20
LcG2	Linne-Shedd silty clay loams, 50 to 75 percent slopes, eroded	40	VIIe-1(15)	91	Clayey	109	1/7
LdA	Lockwood loam, 0 to 2 percent slopes	42	I(14), IIIc-1(15)	85, 89	----------	---	85
LdC	Lockwood loam, 2 to 9 percent slopes	42	IIe-1(14), IIIe-1(15)	85, 87	----------	---	76
LeA	Lockwood shaly loam, 0 to 2 percent slopes	42	IIs-4(14), IIIs-4(15)	86, 89	----------	---	68
LeC	Lockwood shaly loam, 2 to 9 percent slopes	42	IIe-4(14), IIIe-4(15)	85, 88	----------	---	65
LeD	Lockwood shaly loam, 9 to 15 percent slopes	42	IIIe-4(14), IIIe-4(15)	87, 88	----------	---	59
LgA	Lockwood shaly loam, 0 to 2 percent slopes, wet	43	IIw-2(14)	86	----------	---	41
LhE	Lopez shaly loam, 15 to 30 percent slopes	43	VIIe-1(15)	91	Shallow Loamy	113	11
LkF	Los Gatos gravelly loam, 30 to 50 percent slopes	44	VIe-1(15)	91	Loamy	110	12
LkG	Los Gatos gravelly loam, 50 to 75 percent slopes	44	VIIe-1(15)	91	Loamy	110	8
LmD	Los Osos clay loam, 9 to 15 percent slopes	45	IIIe-3(15)	87	Fine Loamy	109	41
LmE	Los Osos clay loam, 15 to 30 percent slopes	45	IVe-3(15)	90	Fine Loamy	109	34
LmF	Los Osos clay loam, 30 to 50 percent slopes	45	VIe-1(15)	91	Fine Loamy	109	34
LmG	Los Osos clay loam, 50 to 75 percent slopes	45	VIIe-1(15)	91	Fine Loamy	109	9
Ln	Los Osos-Millsholm complex	45	VIIe-1(15)	91	----------	---	1/13
	Los Osos part	--	----------	--	Fine Loamy	109	-----
	Millsholm part	--	----------	--	Shallow Loamy	113	-----
MaE	McCoy clay loam, 15 to 30 percent slopes	46	IVe-1(15)	89	Granitic Clay	109	37
MaF	McCoy clay loam, 30 to 50 percent slopes	46	VIe-1(15)	91	Granitic Clay	109	17
MaG	McCoy clay loam, 50 to 75 percent slopes	46	VIIe-1(15)	91	Granitic Clay	109	12
MbE	McCoy-Gilroy complex, 15 to 30 percent slopes	46	IVe-1(15)	89	----------	---	1/33
	McCoy part	--	----------	--	Granitic Clay	109	-----
	Gilroy part	--	----------	--	Granitic	111	1/33
MbG	McCoy-Gilroy complex, 30 to 75 percent slopes	46	VIIe-1(15)	91	----------	---	1/13
	McCoy part	--	----------	--	Granitic Clay	109	-----
	Gilroy part	--	----------	--	Granitic	111	-----
McG	McCoy gravelly loam, very stony subsoil variant, 30 to 75 percent slopes	47	VIIe-1(15)	91	Loamy	110	8
Md	McMullin-Plaskett complex	48	VIIe-1(15)	91	----------	---	1/4
Me	Metz loamy sand	49	IIIs-4(14)	89	----------	---	72
Mf	Metz fine sandy loam	49	IIs-4(14)	86	----------	---	90
Mg	Metz complex	49	IVe-4(14)	90	----------	---	73
MhG	Millsholm loam, 30 to 75 percent slopes	50	VIIe-1(15)	91	Shallow Loamy	113	8

Map symbol	Soil name	Described on page	Capability unit	Page	Range site	Page	Storie index
Mk	Millsholm-Alo association	50	VIIe-1(15)	91	----------	---	1/7
	Millsholm part	--	----------	--	Shallow Loamy	113	-----
	Alo part	--	----------	--	Clayey	109	-----
Mm	Millsholm-Gazos complex	50	VIIe-1(15)	91	----------	---	1/11
	Millsholm part	--	----------	--	Shallow Loamy	113	-----
	Gazos part	--	----------	--	Fine Loamy	109	-----
MnA	Mocho silt loam, 0 to 2 percent slopes	51	I(14), IIIc-1(15)	85, 89	----------	---	100
MoA	Mocho silty clay loam, 0 to 2 percent slopes	51	I(14), IIIc-1(15)	85, 89	----------	---	90
MoC	Mocho silty clay loam, 2 to 9 percent slopes	51	IIe-1(14)	85	----------	---	81
Mp	Montara-Rock outcrop complex	51	VIIs-1(15)	92	Serpentine	113	5
NaD	Nacimiento silty clay loam, 9 to 15 percent slopes	52	IIIe-1(15)	87	Clayey	109	54
NaE	Nacimiento silty clay loam, 15 to 30 percent slopes	52	IVe-1(15)	89	Clayey	109	38
NaF	Nacimiento silty clay loam, 30 to 50 percent slopes	52	VIe-1(15)	91	Clayey	109	22
NaG	Nacimiento silty clay loam, 50 to 75 percent slopes	53	VIIe-1(15)	91	Clayey	109	9
NbF	Nacimiento-Los Osos complex, 30 to 50 percent slopes	53	VIe-1(15)	91	----------	---	1/20
	Nacimiento part	--	----------	--	Clayey	109	-----
	Los Osos part	--	----------	--	Fine Loamy	109	-----
NbG	Nacimiento-Los Osos complex, 50 to 75 percent slopes	53	VIIe-1(15)	91	----------	---	1/10
	Nacimiento part	--	----------	--	Clayey	109	-----
	Los Osos part	--	----------	--	Fine Loamy	109	-----
NcC	Narlon loamy fine sand, 2 to 9 percent slopes	54	IVe-3(14)	90	Claypan	110	22
NcE	Narlon loamy fine sand, 15 to 30 percent slopes	54	VIIe-1(15)	91	Claypan	110	16
OaD	Oceano loamy sand, 2 to 15 percent slopes	55	IVe-4(14), VIe-1(15)	90, 91	Sandy	112	61
Pa	Pacheco clay loam	56	IIw-2(14)	86	---------	---	68
Pb	Pacheco silty clay loam, occasionally flooded	56	IIIw-2(15)	88	---------	---	54
PcC	Parkfield clay, 2 to 9 percent slopes	57	IIIe-5(15)	88	Clayey	109	31
PcE	Parkfield clay, 15 to 30 percent slopes	57	VIe-1(15)	91	Clayey	109	17
PdC	Pfeiffer fine sandy loam, 2 to 9 percent slopes	58	IIIe-1(15)	87	Coarse Loamy	112	68
PdD	Pfeiffer fine sandy loam, 9 to 15 percent slopes	58	IVe-1(15)	89	Coarse Loamy	112	60
Pe	Pfeiffer-Rock outcrop complex	58	VIIIs-1(15)	92	---------	---	8
Pf	Pico fine sandy loam	59	I(14), IIIc-1(15)	85, 89	---------	---	100
PgE	Pinnacles coarse sandy loam, 5 to 30 percent slopes	60	VIe-1(15)	91	Claypan	110	27
PhG2	Pinnacles stony sandy loam, 30 to 75 percent slopes, eroded	60	VIIe-1(15)	91	Coarse Loamy	112	4
PkE	Pinnacles coarse sandy loam, very gravelly subsoil variant, 5 to 30 percent slopes	61	VIe-1(15)	91	Claypan	110	31
PkF	Pinnacles coarse sandy loam, very gravelly subsoil variant, 30 to 50 percent slopes	61	VIIe-1(15)	91	Claypan	110	11

Map symbol	Soil name	Described on page	Capability unit	Page	Range site	Page	Storie index
Pm	Pits and dumps	61	VIIIe-1(15)	92	----------	---	2/<10
PnA	Placentia sandy loam, 0 to 2 percent slopes	62	IIIs-3(14)	89	Claypan	110	45
PnC	Placentia sandy loam, 2 to 9 percent slopes	62	IVe-3(14), IVe-3(15)	90	Claypan	110	37
PnD	Placentia sandy loam, 9 to 15 percent slopes	62	IVe-3(14), IVe-3(15)	90	Claypan	110	34
PnE	Placentia sandy loam, 15 to 30 percent slopes	63	VIe-1(15)	91	Claypan	110	26
PoE	Placentia-Arbuckle complex, 15 to 30 percent slopes	63	VIe-1(15)	91	----------	---	1/36
	Placentia part	--	----------	--	Claypan	110	-----
	Arbuckle part	--	----------	--	Loamy	110	-----
Pp	Plaskett-Reliz complex	63	VIIe-1(15)	91	----------	---	6
	Plaskett part	--	----------	--	----------	---	-----
	Reliz part	--	----------	--	Shallow Loamy	113	-----
Pr	Psamments and Fluvents, occasionally flooded	64	VIw-1(15)	91	Sandy	112	28
Ps	Psamments and Fluvents, frequently flooded	64	VIIIw-1(15)	92	Sandy	112	2/<10
RaA	Rincon clay loam, 0 to 2 percent slopes	65	IIs-3(14)	86	----------	---	68
RaC	Rincon clay loam, 2 to 9 percent slopes	65	IIe-3(14)	85	----------	---	61
RaD	Rincon clay loam, 9 to 15 percent slopes	65	IIIe-3(14)	87	----------	---	58
RaE	Rincon clay loam, 15 to 30 percent slopes	65	IVe-3(14)	90	----------	---	39
Rb	Rindge muck	66	VIw-1(15)	91	----------	---	25
Rc	Rock outcrop-Xerorthents association	66	VIIIs-1(15)	92	----------	---	2/<10
SaA	Salinas loam, 0 to 2 percent slopes	67	I(14)	85	----------	---	100
SbA	Salinas clay loam, 0 to 2 percent slopes	68	I(14)	85	----------	---	85
SbC	Salinas clay loam, 2 to 9 percent slopes	68	IIe-1(14), IIIe-1(15)	85, 87	----------	---	76
ScE	San Andreas fine sandy loam, 15 to 30 percent slopes	68	VIe-1(15)	91	Coarse Loamy	112	43
ScG	San Andreas fine sandy loam, 30 to 75 percent slopes	69	VIIe-1(15)	91	Coarse Loamy	112	14
SdF	San Benito clay loam, 30 to 50 percent slopes	69	VIe-1(15)	91	Fine Loamy	109	20
SdG	San Benito clay loam, 50 to 75 percent slopes	69	VIIe-1(15)	91	Fine Loamy	109	14
SeG	San Timoteo gravelly loam, 30 to 75 percent slopes	70	VIIe-1(15)	91	Loamy	110	12
SfD	Santa Lucia shaly clay loam, 2 to 15 percent slopes	70	IVe-4(15)	90	Loamy	110	29
SfE	Santa Lucia shaly clay loam, 15 to 30 percent slopes	71	IVe-4(15)	90	Loamy	110	22
SfF	Santa Lucia shaly clay loam, 30 to 50 percent slopes	71	VIe-1(15)	91	Loamy	110	12
Sg	Santa Lucia-Reliz association	71	VIIe-1(15)	91	----------	---	1/7
	Santa Lucia part	--	----------	--	Loamy	110	-----
	Reliz part	--	----------	--	Shallow Loamy	113	-----
ShC	Santa Ynez fine sandy loam, 2 to 9 percent slopes	72	IVe-3(14), IVe-3(15)	90	Claypan	110	54
ShD	Santa Ynez fine sandy loam, 9 to 15 percent slopes	73	IVe-3(14), IVe-3(15)	90	Claypan	110	44
ShD2	Santa Ynez fine sandy loam, 5 to 15 percent slopes, eroded	73	IVe-3(15)	90	Claypan	110	32

Map symbol	Soil name	Described on page	Capability unit	Page	Range site	Page	Storie index
ShE	Santa Ynez fine sandy loam, 15 to 30 percent slopes	73	VIe-1(15)	91	Claypan	110	31
SmG3	Shedd silt loam, 30 to 75 percent slopes, severely eroded	74	VIIe-1(15)	91	Loamy	110	9
SnD	Shedd silty clay loam, 9 to 15 percent slopes	74	IVe-1(15)	89	Clayey	109	54
SnE	Shedd silty clay loam, 15 to 30 percent slopes	74	IVe-1(15)	89	Clayey	109	35
SnF2	Shedd silty clay loam, 30 to 50 percent slopes, eroded	74	VIe-1(15)	91	Clayey	109	15
SoD	Sheridan coarse sandy loam, 5 to 15 percent slopes	75	IVe-1(15)	89	Granitic	111	45
SoE	Sheridan coarse sandy loam, 15 to 30 percent slopes	75	VIe-1(15)	91	Granitic	111	35
SoG	Sheridan coarse sandy loam, 30 to 75 percent slopes	75	VIIe-1(15)	91	Granitic	111	13
SpD	Snelling-Greenfield complex, 5 to 15 percent slopes	76	IIIe-1(15)	87	----------	---	1/70
	Snelling part	--	-----------	--	Loamy	110	-----
	Greenfield part	--	-----------	--	Coarse Loamy	112	-----
SpE2	Snelling-Greenfield complex, 9 to 30 percent slopes, eroded	76	IVe-1(15)	89	----------	---	1/57
	Snelling part	--	-----------	--	Loamy	110	-----
	Greenfield part	--	-----------	--	Coarse Loamy	112	-----
SrA	Sorrento clay loam, 0 to 2 percent slopes	77	I(14), IIIc-1(15)	85, 89	----------	---	85
SrC	Sorrento clay loam, 2 to 9 percent slopes	77	IIe-1(14), IIIe-1(15)	85, 87	----------	---	76
Ss	Sur-Junipero complex	78	VIIIe-1(15)	92	----------	---	1/6
St	Sur-Plaskett complex	78	VIIe-1(15)	91	----------	---	1/5
TaC	Tangair fine sand, 2 to 9 percent slopes	79	IIIw-4(14), IVw-4(15)	88, 90	----------	---	53
TbB	Tujunga fine sand, 0 to 5 percent slopes	79	IVe-4(14), IVe-4(15)	90	----------	---	59
VaD	Vista coarse sandy loam, 5 to 15 percent slopes	80	IVe-1(15)	89	Granitic	111	40
VaE	Vista coarse sandy loam, 15 to 30 percent slopes	80	VIe-1(15)	91	Granitic	111	29
VaG	Vista coarse sandy loam, 30 to 75 percent slopes	80	VIIe-1(15)	91	Granitic	111	12
Vb	Vista-Rock outcrop complex	80	VIIs-1(15)	92	Granitic	111	6
Xa	Xererts-Xerolls complex	80	VIIe-1(15)	91	Clayey	109	1/<10
Xb	Xerorthents, sandy	81	VIIe-1(15)	91	Sandy	112	1/<10
Xc	Xerorthents, loamy	81	VIe-1(15)	91	Fine Loamy	109	1/<10
Xd	Xerorthents, dissected	81	VIIe-1(15)	91	Loamy	110	1/<10

1/ Rated according to the proportion of major soils in this complex.

2/ Rated nonagricultural because of impractical conditions of terrain or the use of the soil.

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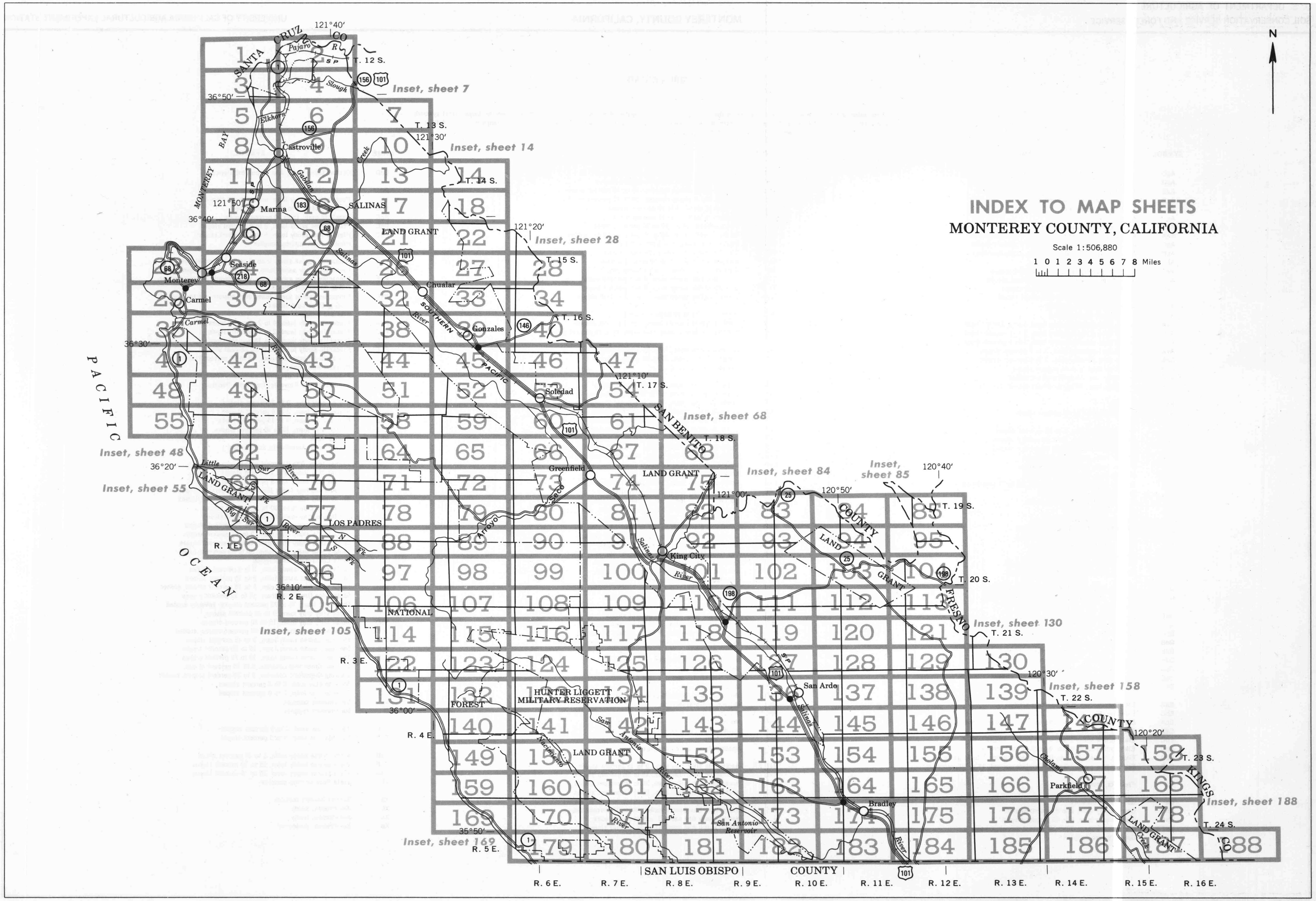
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KINGS
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Marina
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SOIL SERIES TYPE LOCATIONS
Monterey County, CA

Series	Atlas Sheet	Portion on Sheet
Alo	94	Northwest
Alviso	5	Southwest
Antioch	21	Center
Arbuckle	152	Center
Arnold	9	North-central
Arroyo Seco	74	West-central
Ayar	72	West-central
Baywood	15	Southeast
Chamise	91	Center
Chualar	32	Northeast
Cieneba	27	Northeast
Clear Lake	16	South-central
Climara	148	South-central
Cropley	21	Southwest
Danville	33	South-central
Diablo	111	North-central
Dibble	181	West-central
Docas	111	Center
Elder	26	Northeast
Elkhorn	9	North-central
Elkhorn variant	3	South-central
Gamboa	149	West-central
Garey	101	Southwest
Gaviota	72	West-central
Gazos	136	South-central
Gilroy	104	West-central
Gloria	40	Southwest
Gorgonio	50	East-central
Greenfield	118	East-central
Haire	50	Center
Hanford	40	Southwest
Henneke	180	Northwest
Junipero	71	Center
Linne	74	Southeast
Lockwood	81	South-central
Lopez	143	East-central
Los Gatos	159	Southeast
Los Osos	139	Northwest
McCoy	28	South-central
McCoy variant	131	Center
McMullin	160	Northwest
Metz	26	South-central
Millsholm	88	North-central
Mocho	92	Northwest
Montara	187	South-central
Nacimiento	184	West-central
Narlon	29	North-central
Oceano	15	North-central
Pacheco	12	West-central
Parkfield	167	Southeast
Pfeiffer	140	Northwest
Pico	45	North-central
Pinnacles	54	North-central
Pinnacles variant	142	Northeast
Placentia	39	North-central
Plaskett	160	Northwest
Reliz	90	East-central
Rincon	110	Northeast
Rindge	4	Northwest
Salinas	81	Northeast
San Andreas	37	Center
San Benito	93	South-central
San Timoteo	54	Southwest
Santa Lucia	80	South-central
Santa Ynez	37	Center
Shedd	93	Southwest
Sheridan	28	South-central
Snelling	101	Northeast
Sorrento	83	Center
Sur	132	South-central
Tangair	23	Southwest
Tujunga	50	East-central
Vista	33	Southeast

NORTHWEST	NORTH-CENTRAL	NORTHEAST
WEST-CENTRAL	CENTER	EAST-CENTRAL
SOUTHWEST	SOUTH-CENTRAL	SOUTHEAST

CONVENTIONAL SIGNS

WORKS AND STRUCTURES

Highways and roads
- Divided
- Good motor
- Poor motor
- Trail

Highway markers
- National Interstate
- U. S.
- State or county

Railroads
- Single track
- Multiple track
- Abandoned

Bridges and crossings
- Road
- Trail
- Railroad
- Ferry (FY)
- Ford (FORD)
- Grade
- R. R. over
- R. R. under

Buildings
- School
- Church

Mine and quarry (QU.)

Gravel pit (G.P.)

Power line

Pipeline

Cemetery

Dams

Levee

Tanks

Well, oil or gas

Forest fire or lookout station

Airway beacon

Located object

BOUNDARIES

- National or state
- County
- Limit of soil survey
- Reservation
- Land grant
- Small park, cemetery, airport
- Land survey division corners

DRAINAGE

Streams, double-line
- Perennial
- Intermittent

Streams, single-line
- Perennial
- Intermittent
  - Crossable with tillage implements
  - Not crossable with tillage implements
- Unclassified

Canals and ditches

Lakes and ponds
- Perennial (water, w)
- Intermittent (int)

Spring

Marsh or swamp

Wet spot

Drainage end or alluvial fan

RELIEF

Escarpments
- Bedrock
- Other

Short steep slope

Prominent peak

Depressions (Large, Small)
- Crossable with tillage implements
- Not crossable with tillage implements
- Contains water most of the time

SOIL SURVEY DATA

Soil boundary and symbol (Dx)

Gravel

Stoniness
- Stony
- Very stony

Rock outcrops

Chert fragments

Clay spot

Sand spot

Gumbo or scabby spot

Made land

Severely eroded spot

Blowout, wind erosion

Gully

Glacial till

Saline spot

Soil sample site

SOIL LEGEND

The first letter, always a capital, is the initial one of the soil name. A second capital letter, A, B, C, D, E, F, or G, shows the slope. Most symbols without a slope letter are for those of nearly level soils, but some are for complexes or land types that have a considerable range in slope. A final number, 2 or 3, in the symbol shows that the soil is eroded or severely eroded.

SYMBOL	NAME
AaC	Alo silty clay, 2 to 9 percent slopes
AaD	Alo silty clay, 9 to 15 percent slopes
AaE	Alo silty clay, 15 to 30 percent slopes
AaF	Alo silty clay, 30 to 50 percent slopes
Ab	Alo-Millsholm complex
Ac	Alviso silty clay loam
Ad	Alviso silty clay loam, drained
AeA	Antioch very fine sandy loam, 0 to 2 percent slopes
AeC	Antioch very fine sandy loam, 2 to 9 percent slopes
AeD	Antioch very fine sandy loam, 9 to 15 percent slopes
Af	Aquic Xerofluvents
AgC	Arbuckle gravelly loam, 2 to 9 percent slopes
AgD	Arbuckle gravelly loam, 9 to 15 percent slopes
AkD	Arnold loamy sand, 9 to 15 percent slopes
AkF	Arnold loamy sand, 15 to 50 percent slopes
Am	Arnold-San Andreas complex
Ar	Arnold-Santa Ynez complex
AsA	Arroyo Seco gravelly sandy loam, 0 to 2 percent slopes
AsB	Arroyo Seco gravelly sandy loam, 2 to 5 percent slopes
AsC	Arroyo Seco gravelly sandy loam, 5 to 9 percent slopes
AvA	Arroyo Seco gravelly loam, 0 to 2 percent slopes
AvB	Arroyo Seco gravelly loam, 2 to 5 percent slopes
AyD	Ayar silty clay, 5 to 15 percent slopes
AyE	Ayar silty clay, 15 to 30 percent slopes
AyF	Ayar silty clay, 30 to 50 percent slopes
Ba	Badland
BbC	Baywood sand, 2 to 15 percent slopes
CaD	Chamise shaly loam, 9 to 15 percent slopes
CaE	Chamise shaly loam, 15 to 30 percent slopes
CaF	Chamise shaly loam, 30 to 50 percent slopes
CbA	Chualar loam, 0 to 2 percent slopes
CbB	Chualar loam, 2 to 5 percent slopes
CbC	Chualar loam, 5 to 9 percent slopes
CcG	Cieneba fine gravelly sandy loam, 30 to 75 percent slopes
Cd	Cieneba-Rock outcrop complex
Ce	Cieneba-Sur-Rock outcrop complex
Cf	Clear Lake clay
Cg	Clear Lake clay, moderately wet
ChE	Climara clay, 15 to 30 percent slopes
ChF	Climara clay, 30 to 50 percent slopes
Ck	Climara-Montara complex
Cm	Coastal beaches
CnA	Cropley silty clay, 0 to 2 percent slopes
CnC	Cropley silty clay, 2 to 9 percent slopes
DaA	Danville sandy clay loam, 0 to 2 percent slopes
DaC	Danville sandy clay loam, 2 to 9 percent slopes
DbD	Diablo clay, 9 to 15 percent slopes
DbE	Diablo clay, 15 to 30 percent slopes
DbF	Diablo clay, 30 to 50 percent slopes
DcC	Dibble loam, 2 to 9 percent slopes
DdB	Dibble silt loam, 9 to 15 percent slopes
DdE	Dibble silt loam, 15 to 30 percent slopes
DdF	Dibble silt loam, 30 to 50 percent slopes
DeA	Docas silty clay loam, 0 to 2 percent slopes
DeC	Docas silty clay loam, 2 to 9 percent slopes
Df	Dune land
EaA	Elder sandy loam, 0 to 2 percent slopes
EbC	Elder very fine sandy loam, 2 to 9 percent slopes
EcA	Elder loam, gravelly substratum, 0 to 2 percent slopes
EdB	Elkhorn fine sandy loam, 2 to 5 percent slopes
EdC	Elkhorn fine sandy loam, 5 to 9 percent slopes
EdD	Elkhorn fine sandy loam, 9 to 15 percent slopes
EeD	Elkhorn fine sandy loam, thin surface variant, 5 to 15 percent slopes
EeE	Elkhorn fine sandy loam, thin surface variant, 15 to 30 percent slopes
Fa	Fluvents, stony
Ga	Gamboa-Sur complex
GbC	Garey sandy loam, 2 to 9 percent slopes
GbE	Garey sandy loam, 9 to 30 percent slopes
GbF2	Garey sandy loam, 30 to 50 percent slopes, eroded
Gc	Garey-Oceano complex

SYMBOL	NAME
GdE	Gaviota sandy loam, 15 to 30 percent slopes
GdF	Gaviota sandy loam, 30 to 75 percent slopes
GeE	Gaviota-San Andreas complex, 15 to 30 percent slopes
GeG	Gaviota-San Andreas complex, 30 to 75 percent slopes
GfE	Gazos silt loam, 15 to 30 percent slopes
GfF	Gazos silt loam, 30 to 50 percent slopes
GgE	Gilroy gravelly loam, 15 to 50 percent slopes
GgG2	Gilroy gravelly loam, 30 to 75 percent slopes, eroded
GhC	Gloria sandy loam, 2 to 9 percent slopes
GhD	Gloria sandy loam, 9 to 15 percent slopes
GhF	Gloria sandy loam, 15 to 50 percent slopes
GkB	Gorgonio sandy loam, 0 to 5 percent slopes
GmB	Greenfield fine sandy loam, 2 to 5 percent slopes
GmC	Greenfield fine sandy loam, 5 to 9 percent slopes
GmD	Greenfield fine sandy loam, 9 to 15 percent slopes
HaE	Haire loam, 15 to 30 percent slopes
HbB	Hanford gravelly sandy loam, 0 to 5 percent slopes
HcF	Henneke extremely stony clay loam, 15 to 75 percent slopes
JaF	Junipero loamy sand, 30 to 50 percent slopes
JbG	Junipero sandy loam, 30 to 75 percent slopes
Jc	Junipero-Sur complex
LaD	Linne silty clay loam, 5 to 15 percent slopes
LaE	Linne silty clay loam, 15 to 30 percent slopes
LaF	Linne silty clay loam, 30 to 50 percent slopes
LbD	Linne-Diablo complex, 9 to 15 percent slopes
LbE	Linne-Diablo complex, 15 to 30 percent slopes
LcE	Linne-Shedd silty clay loams, 15 to 30 percent slopes
LcF	Linne-Shedd silty clay loams, 30 to 50 percent slopes
LcF2	Linne-Shedd silty clay loams, 15 to 50 percent slopes, eroded
LcG2	Linne-Shedd silty clay loams, 50 to 75 percent slopes, eroded
LdA	Lockwood loam, 0 to 2 percent slopes
LdC	Lockwood loam, 2 to 9 percent slopes
LeA	Lockwood shaly loam, 0 to 2 percent slopes
LeC	Lockwood shaly loam, 2 to 9 percent slopes
LeD	Lockwood shaly loam, 9 to 15 percent slopes
LgA	Lockwood shaly loam, 0 to 2 percent slopes, wet
LhE	Lopez shaly loam, 15 to 30 percent slopes
LkF	Los Gatos gravelly loam, 30 to 50 percent slopes
LkG	Los Gatos gravelly loam, 50 to 75 percent slopes
LmD	Los Osos clay loam, 9 to 15 percent slopes
LmE	Los Osos clay loam, 15 to 30 percent slopes
LmF	Los Osos clay loam, 30 to 50 percent slopes
LmG	Los Osos clay loam, 50 to 75 percent slopes
Ln	Los Osos-Millsholm complex
MaE	McCoy clay loam, 15 to 30 percent slopes
MaF	McCoy clay loam, 30 to 50 percent slopes
MaG	McCoy clay loam, 50 to 75 percent slopes
MbE	McCoy-Gilroy complex, 15 to 30 percent slopes
MbG	McCoy-Gilroy complex, 30 to 75 percent slopes
McG	McCoy gravelly loam, very stony subsoil variant, 30 to 75 percent slopes
Md	McMullin-Plaskett complex
Me	Metz loamy sand
Mf	Metz fine sandy loam
Mg	Metz complex
MhG	Millsholm loam, 30 to 75 percent slopes
Mk	Millsholm-Alo association
Mm	Millsholm-Gazos complex
MnA	Mocho silt loam, 0 to 2 percent slopes
MoA	Mocho silty clay loam, 0 to 2 percent slopes
MoC	Mocho silty clay loam, 2 to 9 percent slopes
Mp	Montara-Rock outcrop complex
NaD	Nacimiento silty clay loam, 9 to 15 percent slopes
NaE	Nacimiento silty clay loam, 15 to 30 percent slopes
NaF	Nacimiento silty clay loam, 30 to 50 percent slopes
NaG	Nacimiento silty clay loam, 50 to 75 percent slopes
NbF	Nacimiento-Los Osos complex, 30 to 50 percent slopes
NbG	Nacimiento-Los Osos complex, 50 to 75 percent slopes
NcC	Narlon loamy fine sand, 2 to 9 percent slopes
NcE	Narlon loamy fine sand, 15 to 30 percent slopes

NAME	SYMBOL
OaD	Oceano loamy sand, 2 to 15 percent slopes
Pa	Pacheco clay loam
Pb	Pacheco silty clay loam, occasionally flooded
PcC	Parkfield clay, 2 to 9 percent slopes
PcE	Parkfield clay, 15 to 30 percent slopes
PdC	Pfeiffer fine sandy loam, 2 to 9 percent slopes
PdD	Pfeiffer fine sandy loam, 9 to 15 percent slopes
Pe	Pfeiffer-Rock outcrop complex
Pf	Pico fine sandy loam
PgE	Pinnacles coarse sandy loam, 5 to 30 percent slopes
PhG2	Pinnacles stony sandy loam, 30 to 75 percent slopes, eroded
PkE	Pinnacles coarse sandy loam, very gravelly subsoil variant, 5 to 30 percent slopes
PkF	Pinnacles coarse sandy loam, very gravelly subsoil variant, 30 to 50 percent slopes
Pm	Pits and dumps
PnA	Placentia sandy loam, 0 to 2 percent slopes
PnC	Placentia sandy loam, 2 to 9 percent slopes
PnD	Placentia sandy loam, 9 to 15 percent slopes
PnE	Placentia sandy loam, 15 to 30 percent slopes
PoE	Placentia-Arbuckle complex, 15 to 30 percent slopes
Pp	Plaskett-Reliz complex
Pr	Psamments and Fluvents, occasionally flooded
Ps	Psamments and Fluvents, frequently flooded
RaA	Rincon clay loam, 0 to 2 percent slopes
RaC	Rincon clay loam, 2 to 9 percent slopes
RaD	Rincon clay loam, 9 to 15 percent slopes
RaE	Rincon clay loam, 15 to 30 percent slopes
Rb	Rindge muck
Rc	Rock outcrop-Xerorthents association
SaA	Salinas loam, 0 to 2 percent slopes
SbA	Salinas clay loam, 0 to 2 percent slopes
SbC	Salinas clay loam, 2 to 9 percent slopes
ScE	San Andreas fine sandy loam, 15 to 30 percent slopes
ScG	San Andreas fine sandy loam, 30 to 75 percent slopes
SdF	San Benito clay loam, 30 to 50 percent slopes
SdG	San Benito clay loam, 50 to 75 percent slopes
SeG	San Timoteo gravelly loam, 30 to 75 percent slopes
SfD	Santa Lucia shaly clay loam, 2 to 15 percent slopes
SfE	Santa Lucia shaly clay loam, 15 to 30 percent slopes
SfF	Santa Lucia shaly clay loam, 30 to 50 percent slopes
Sg	Santa Lucia-Reliz association
ShC	Santa Ynez fine sandy loam, 2 to 9 percent slopes
ShD	Santa Ynez fine sandy loam, 9 to 15 percent slopes
ShD2	Santa Ynez fine sandy loam, 5 to 15 percent slopes, eroded
ShE	Santa Ynez fine sandy loam, 15 to 30 percent slopes
SmG3	Shedd silt loam, 30 to 75 percent slopes, severely eroded
SnD	Shedd silty clay loam, 9 to 15 percent slopes
SnE	Shedd silty clay loam, 15 to 30 percent slopes
SnF2	Shedd silty clay loam, 30 to 50 percent slopes, eroded
SoD	Sheridan coarse sandy loam, 5 to 15 percent slopes
SoE	Sheridan coarse sandy loam, 15 to 30 percent slopes
SoG	Sheridan coarse sandy loam, 30 to 75 percent slopes
SpD	Snelling-Greenfield complex, 5 to 15 percent slopes
SpE2	Snelling-Greenfield complex, 9 to 30 percent slopes, eroded
SrA	Sorrento clay loam, 0 to 2 percent slopes
SrC	Sorrento clay loam, 2 to 9 percent slopes
Ss	Sur-Junipero complex
St	Sur-Plaskett complex
TaC	Tangair fine sand, 2 to 9 percent slopes
TbB	Tujunga fine sand, 0 to 5 percent slopes
VaD	Vista coarse sandy loam, 5 to 15 percent slopes
VaE	Vista coarse sandy loam, 15 to 30 percent slopes
VaG	Vista coarse sandy loam, 30 to 75 percent slopes
Vb	Vista-Rock outcrop complex
Xa	Xererts-Xerolls complex
Xb	Xerorthents, sandy
Xc	Xerorthents, loamy
Xd	Xerorthents, dissected

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 1

MONTEREY COUNTY, CALIFORNIA NO. 1

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 2

2

N

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA NO. 2

MONTEREY COUNTY, CALIFORNIA NO. 3

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

N

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 4

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

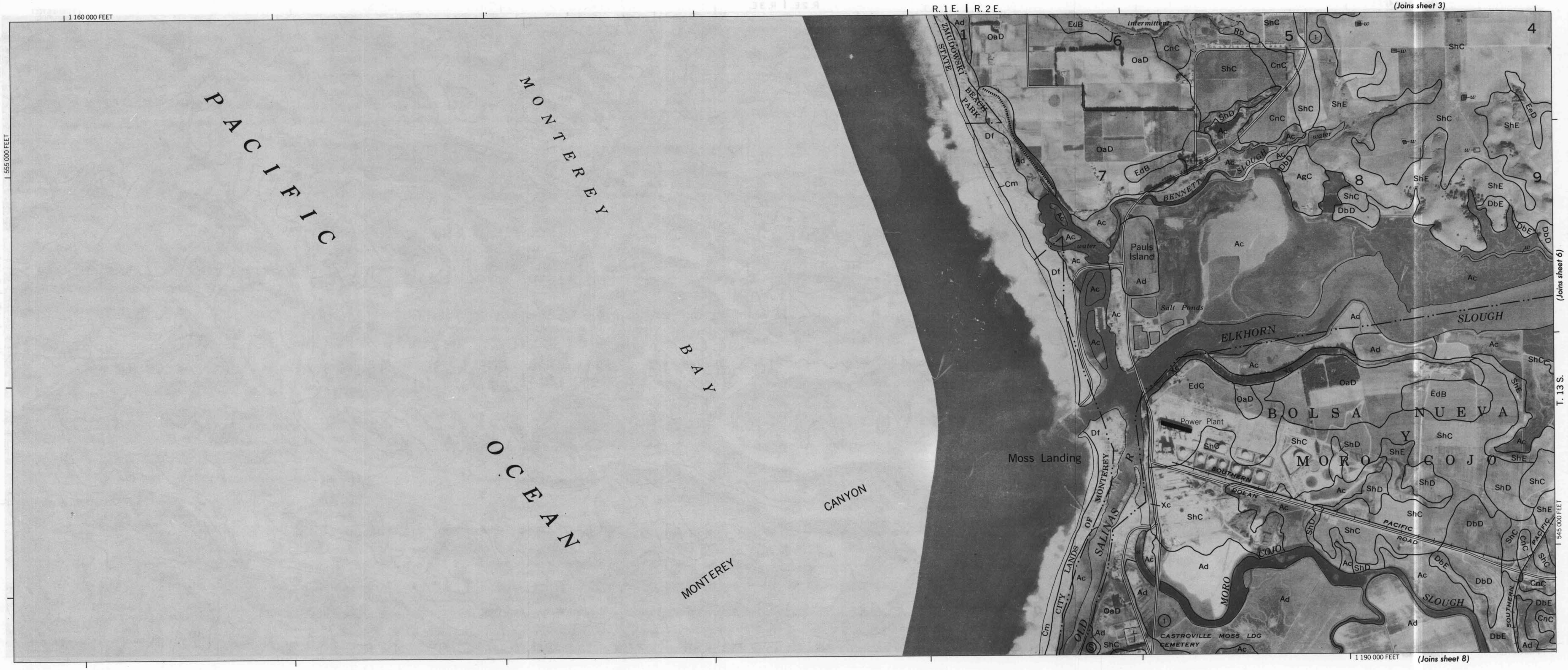
Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA NO. 4

5

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

MONTEREY COUNTY, CALIFORNIA NO. 5

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 6

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

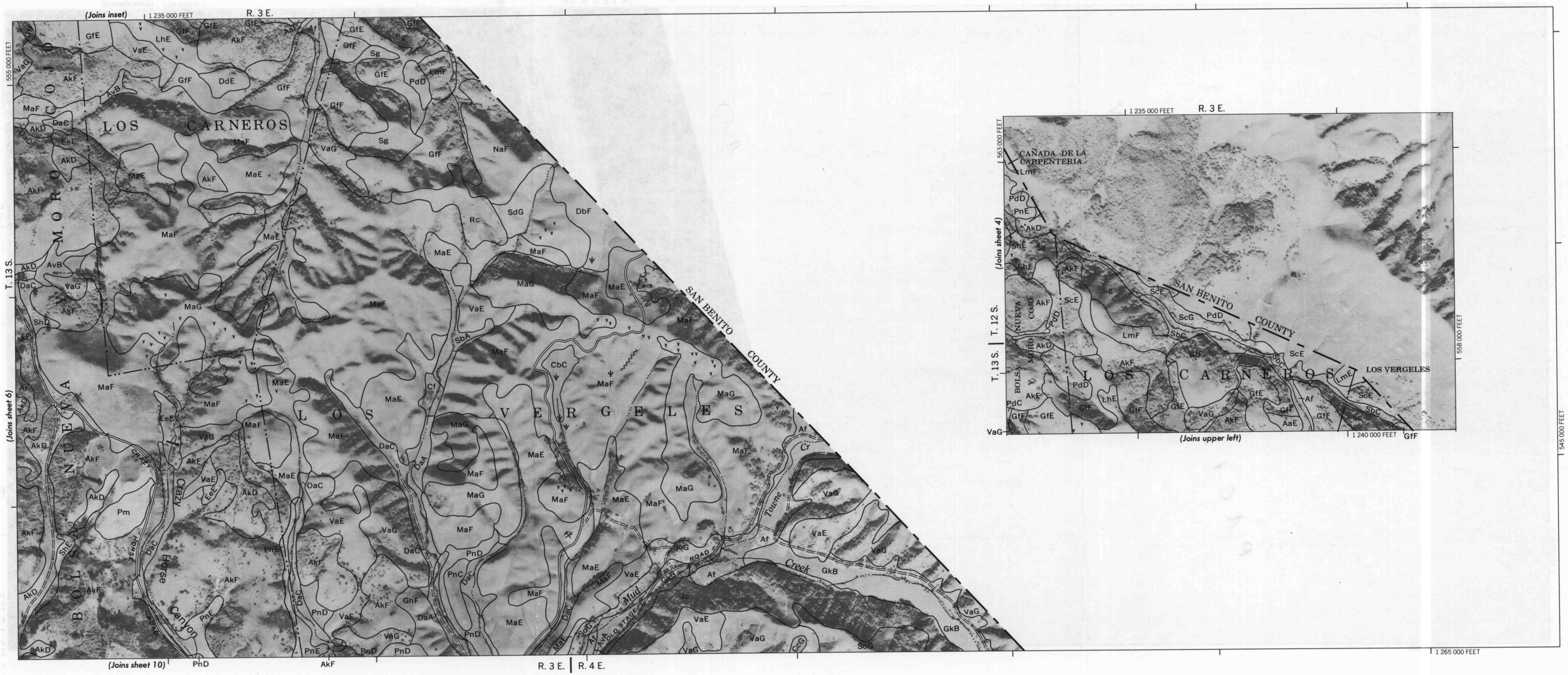
This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

7

N

MONTEREY COUNTY, CALIFORNIA NO. 7

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

8

N

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

9

N

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

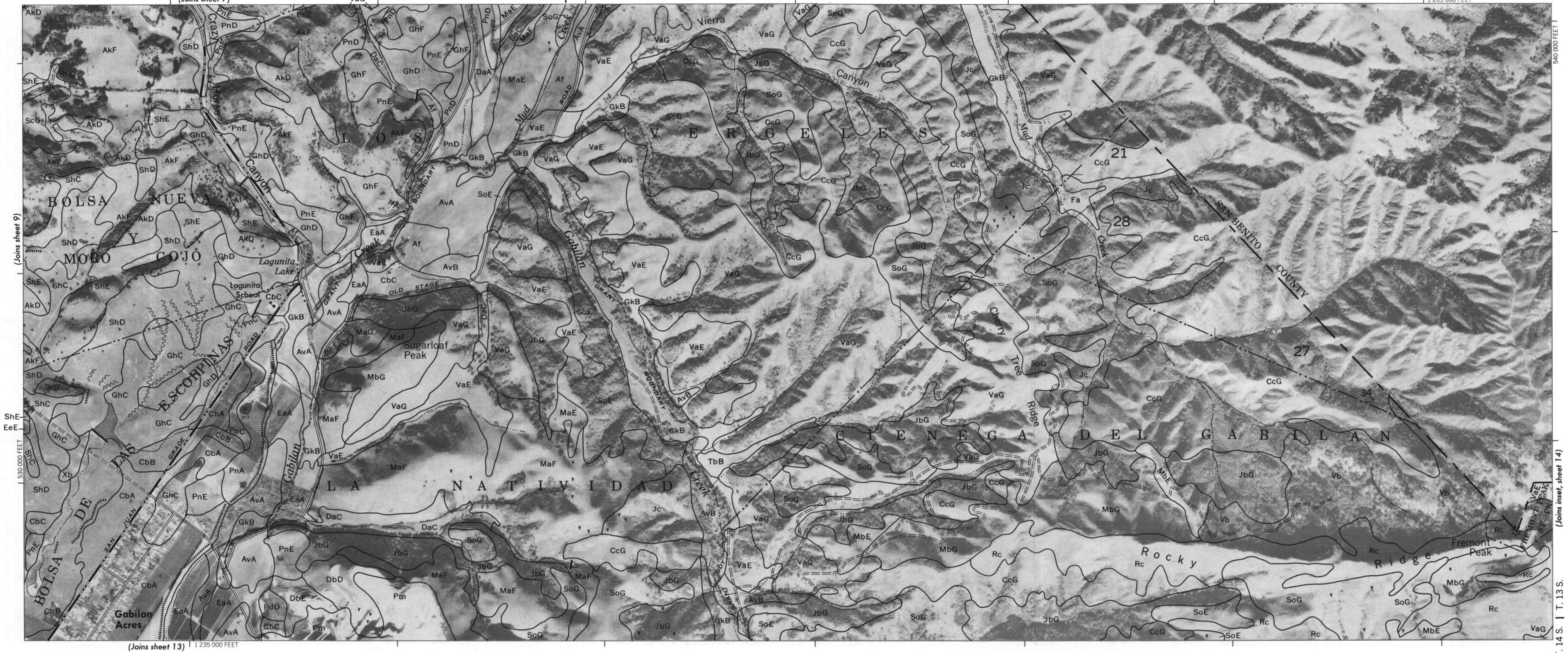
Scale 1:24 000

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

N

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 10



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA NO. 10

MONTEREY COUNTY, CALIFORNIA NO. 11

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

(12)

N

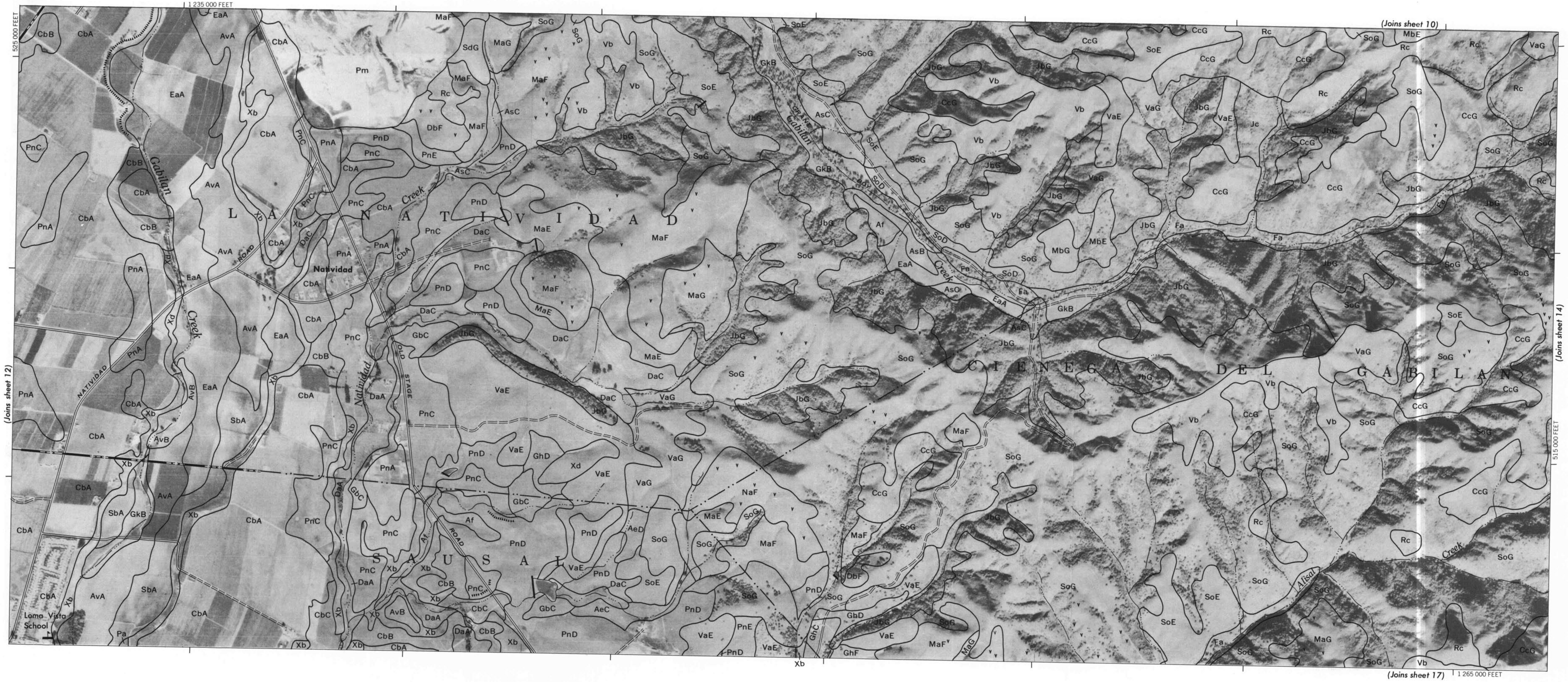
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

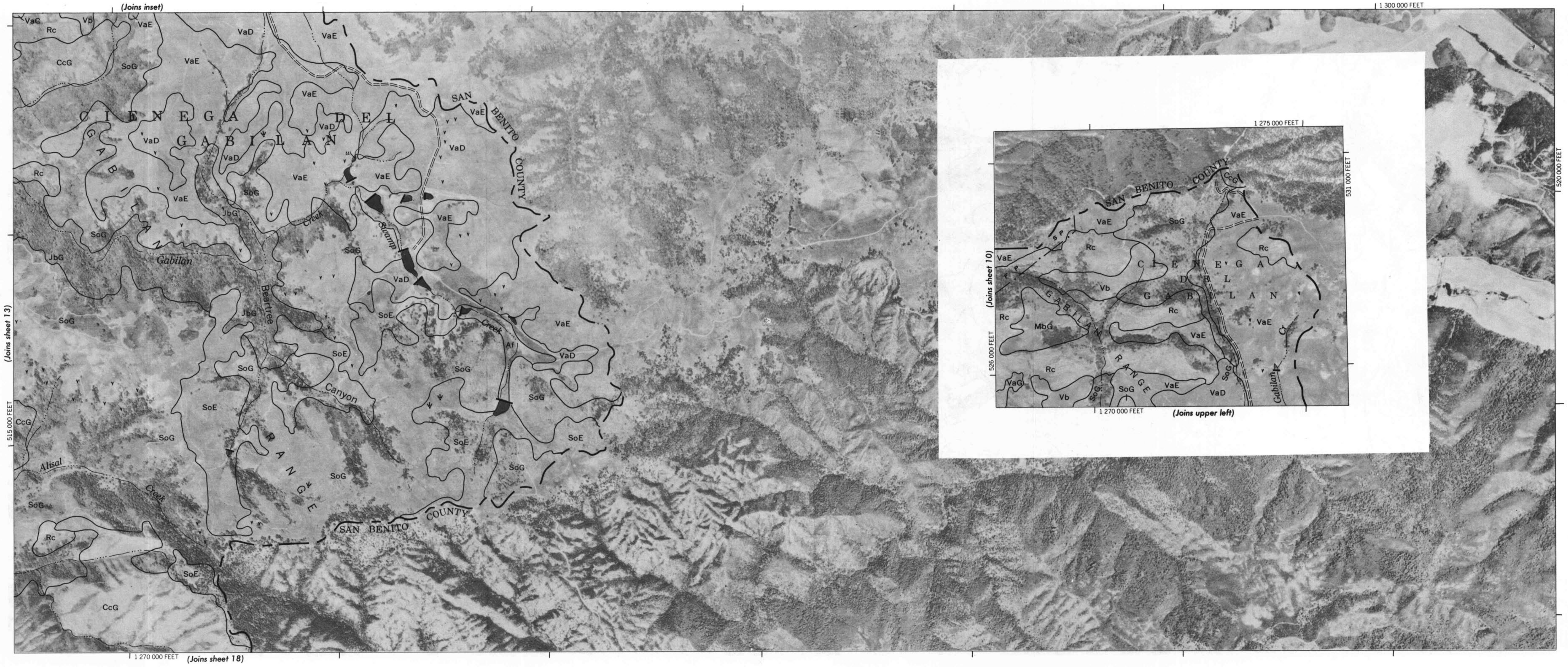
Scale 1:24000

MONTEREY COUNTY, CALIFORNIA NO. 13

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 14



1 ¾ ½ ¼ 0 1 2 Miles

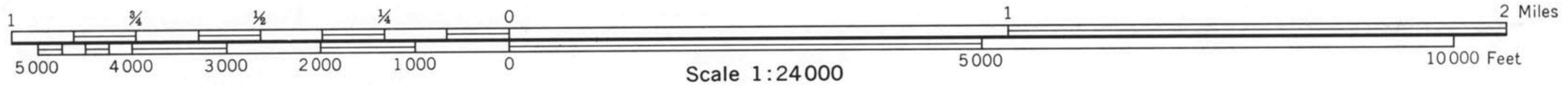
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

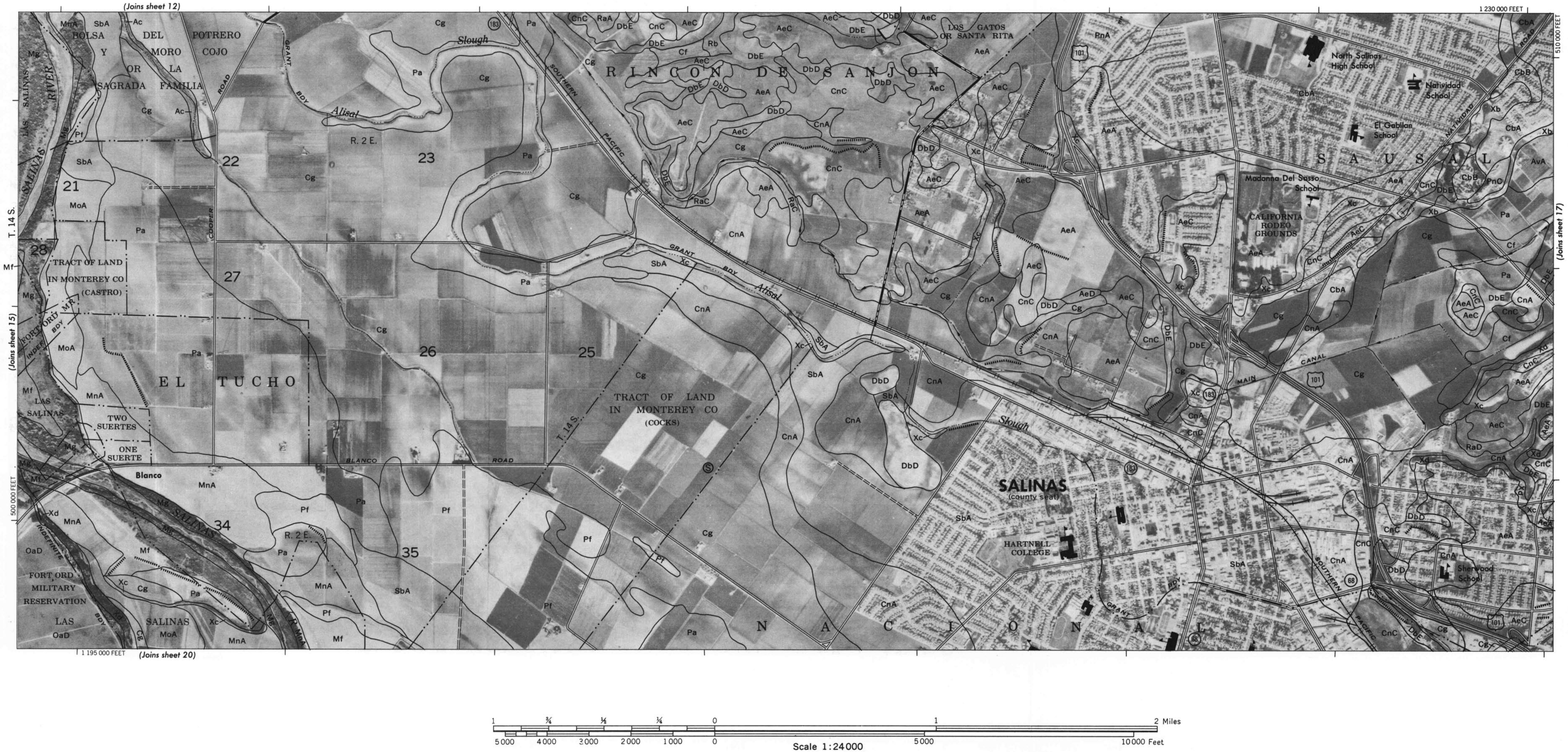
This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

15

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



Scale 1:24000

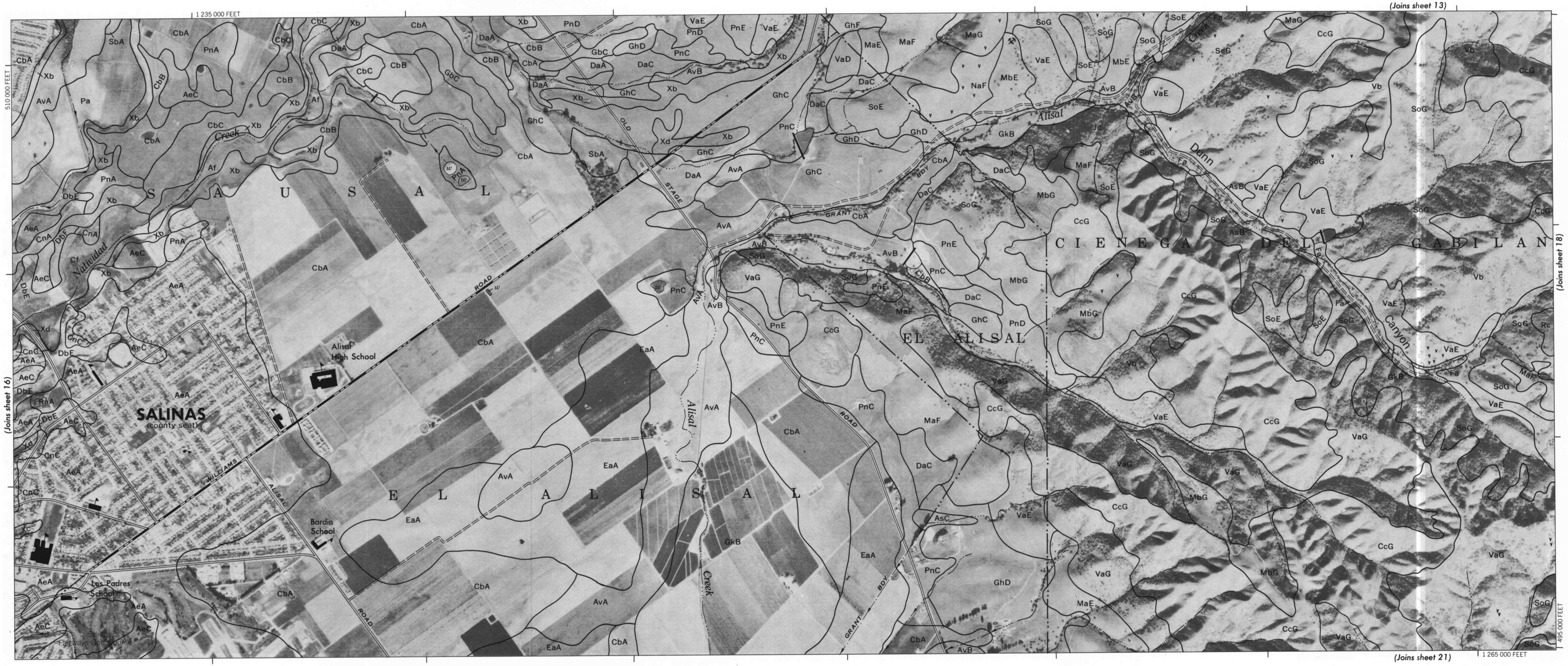


This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

MONTEREY COUNTY, CALIFORNIA NO. 17

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

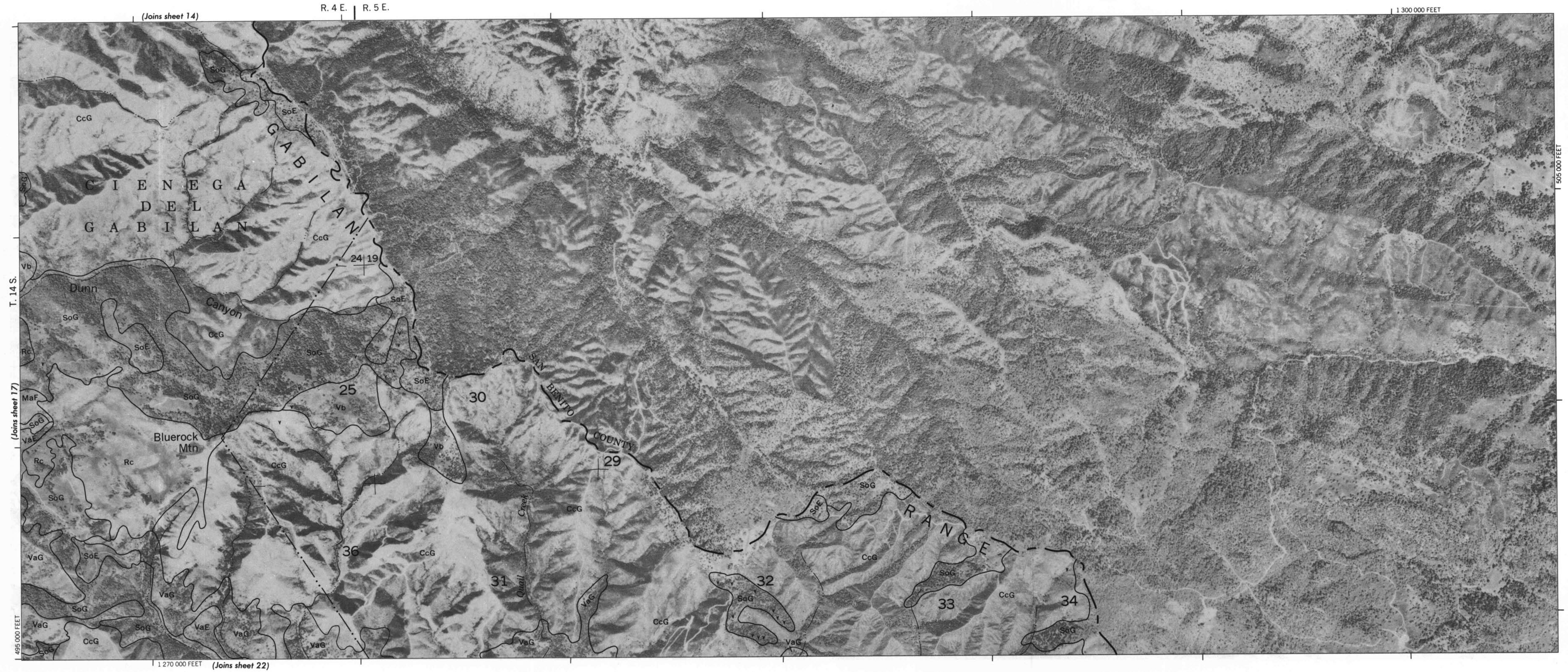


1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

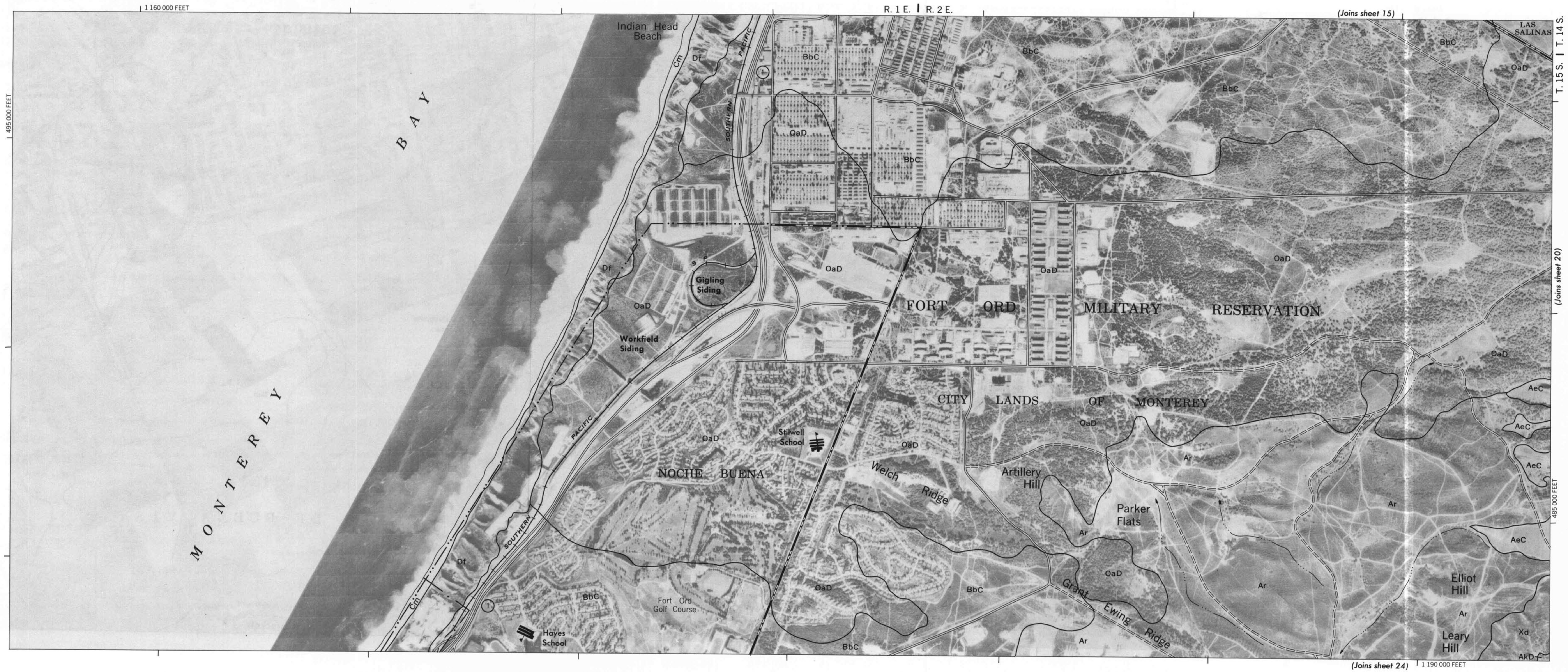
This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA NO. 18

19

N

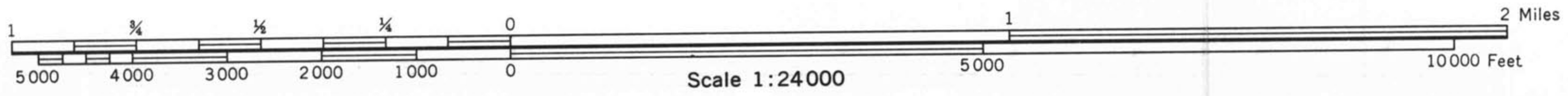
This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000



This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

21

N

1	¾	½	¼	0	1	2 Miles

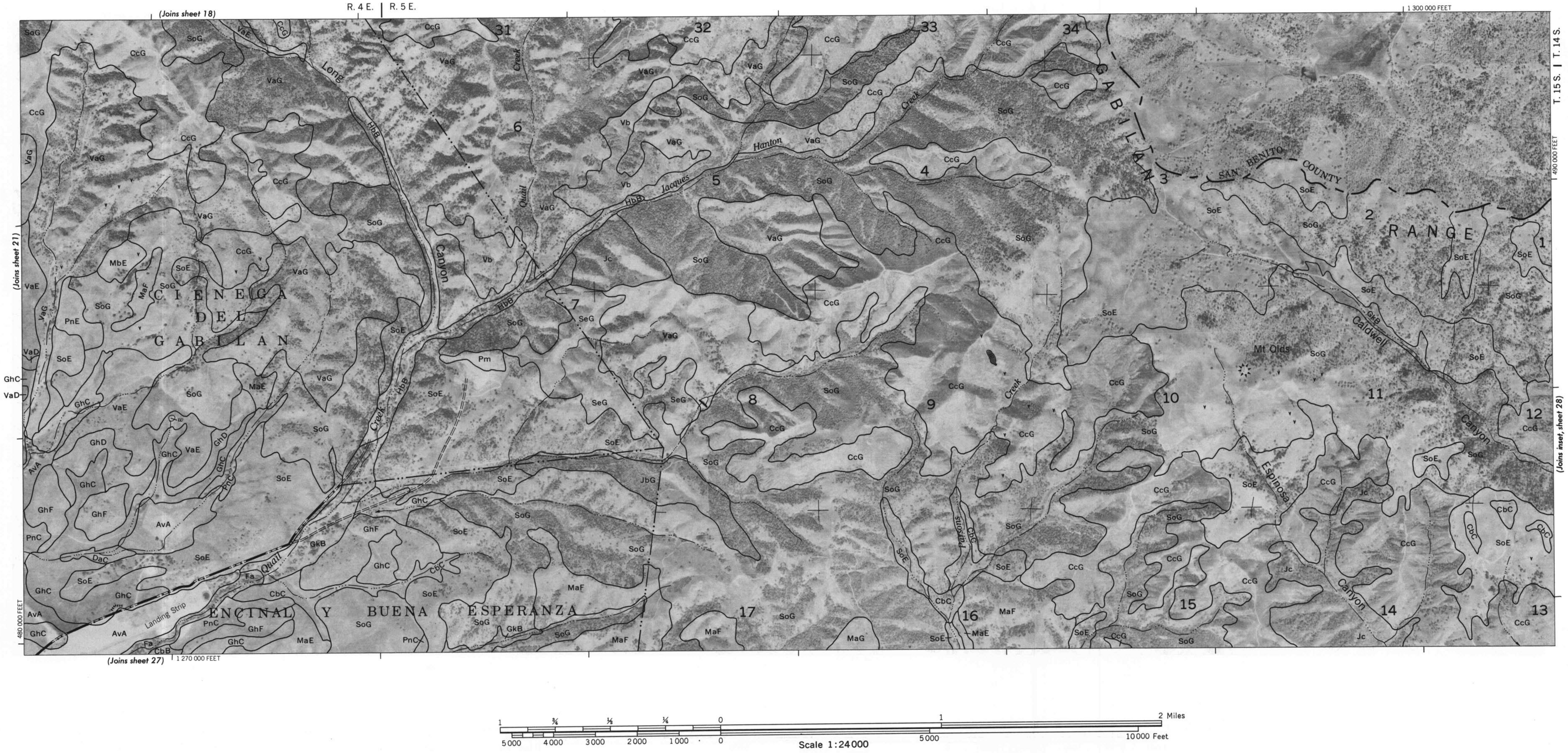
5000	4000	3000	2000	1000	0	5000	10000 Feet

Scale 1:24000

MONTEREY COUNTY, CALIFORNIA NO. 21

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N



This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

Scale 1:24000

2 Miles
1
0
¼
½
¾
1

10000 Feet
5000
0
1000
2000
3000
4000
5000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

25

N

R. 2 E. | R. 3 E.

MONTEREY COUNTY, CALIFORNIA NO. 25

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

N

1 — ¾ — ½ — ¼ — 0 — 1 — 2 Miles

5 000 — 4 000 — 3 000 — 2 000 — 1 000 — 0 — 5 000 — 10 000 Feet

Scale 1:24 000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

27

N

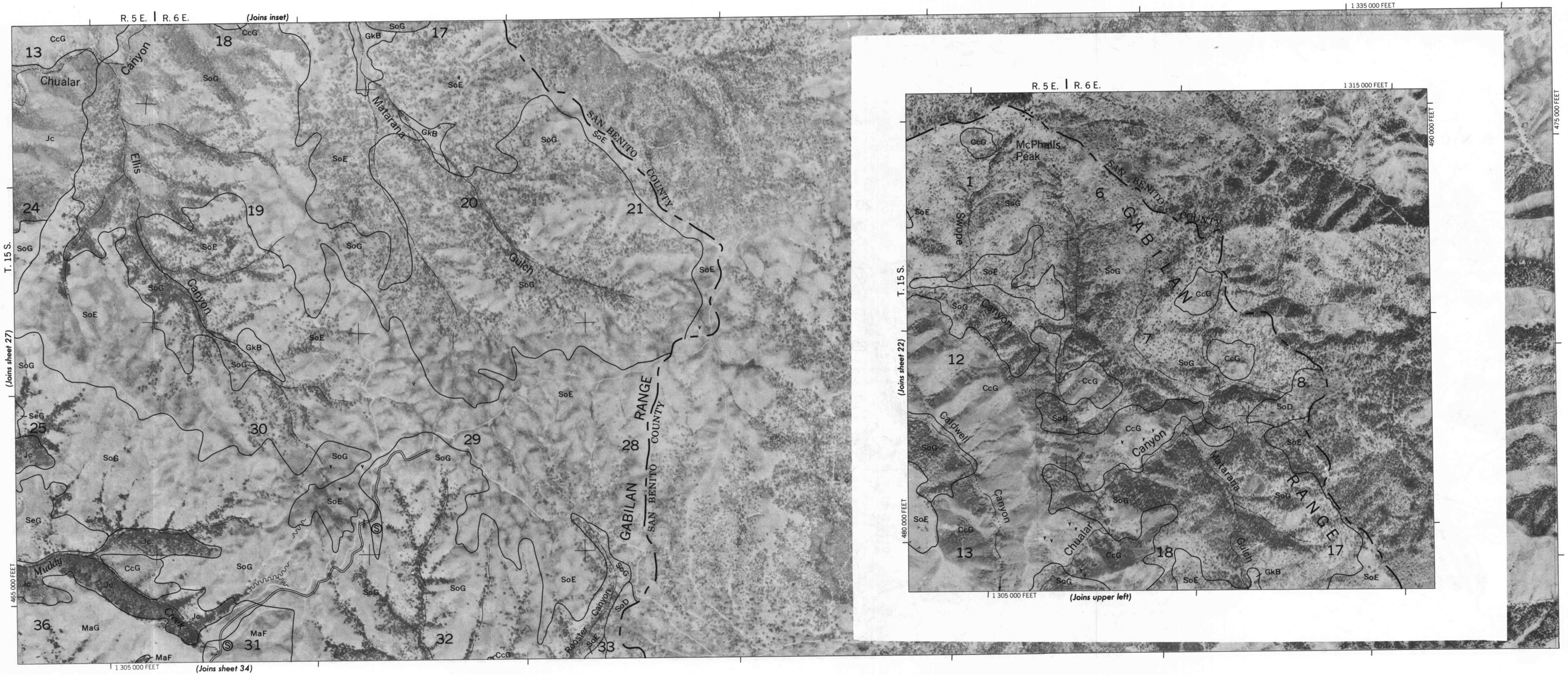
MONTEREY COUNTY, CALIFORNIA NO. 27

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1	¾	½	¼	0		1		2 Miles
5000	4000	3000	2000	1000	0	5000		10000 Feet

Scale 1:24000

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

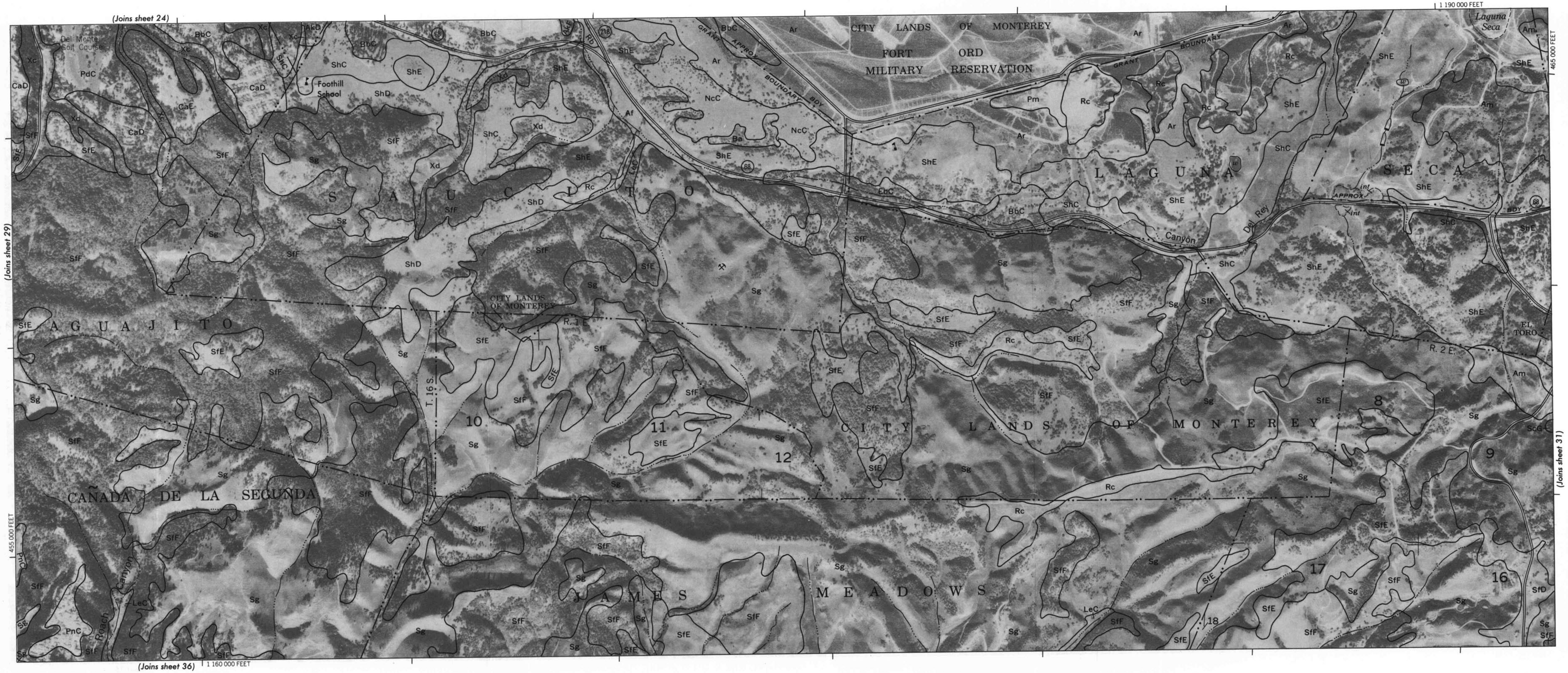
Scale 1:24000

MONTEREY COUNTY, CALIFORNIA NO. 29

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 30



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

Scale 1:24 000

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 10 000 Feet

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

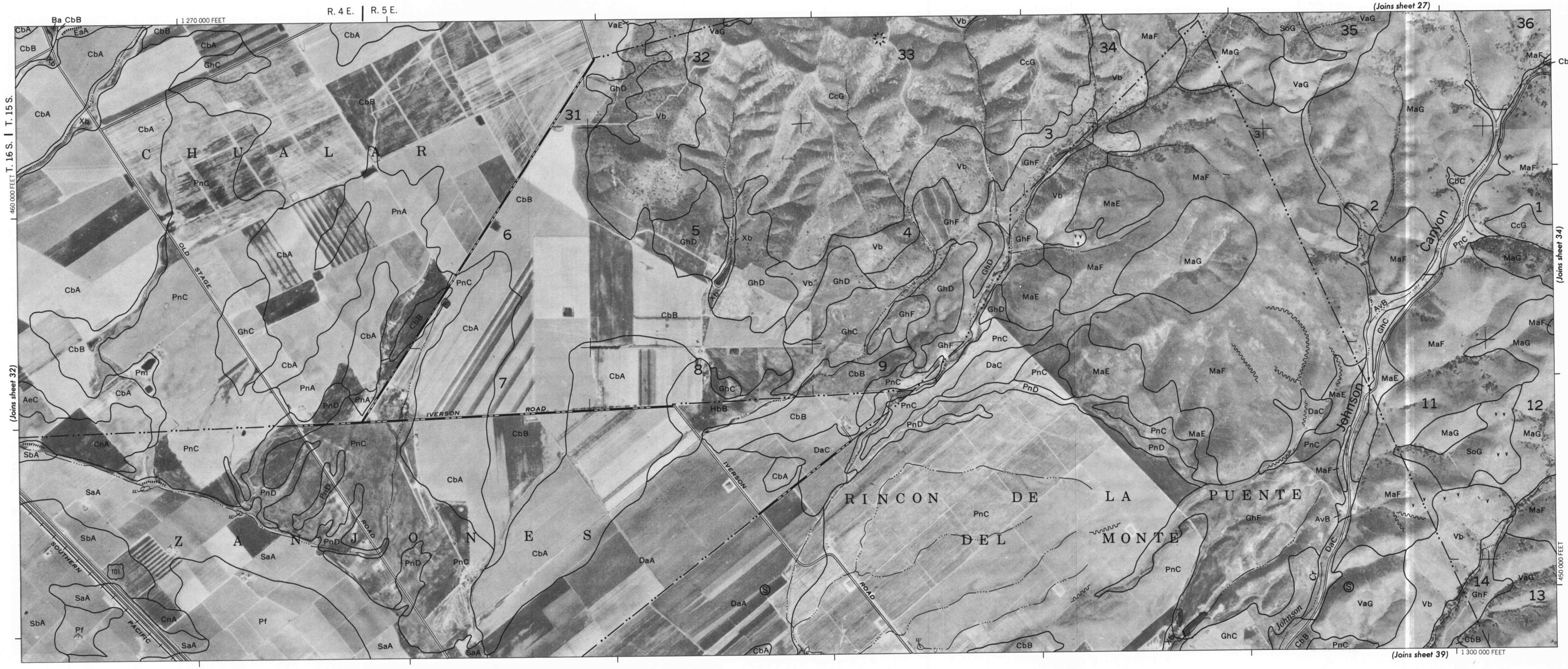
Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

MONTEREY COUNTY, CALIFORNIA NO. 33

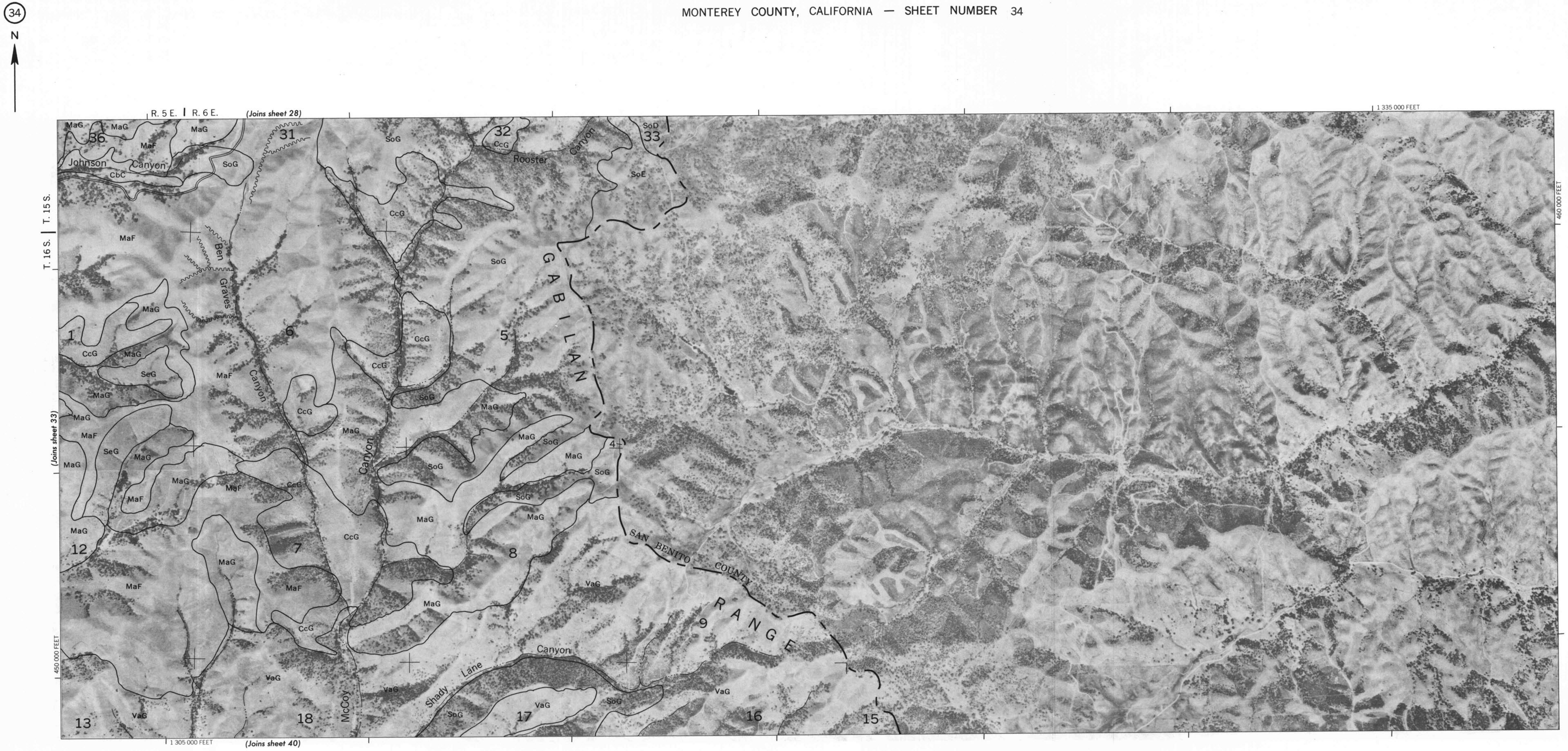
This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000



1 — ¾ — ½ — ¼ — 0 — 1 — 2 Miles

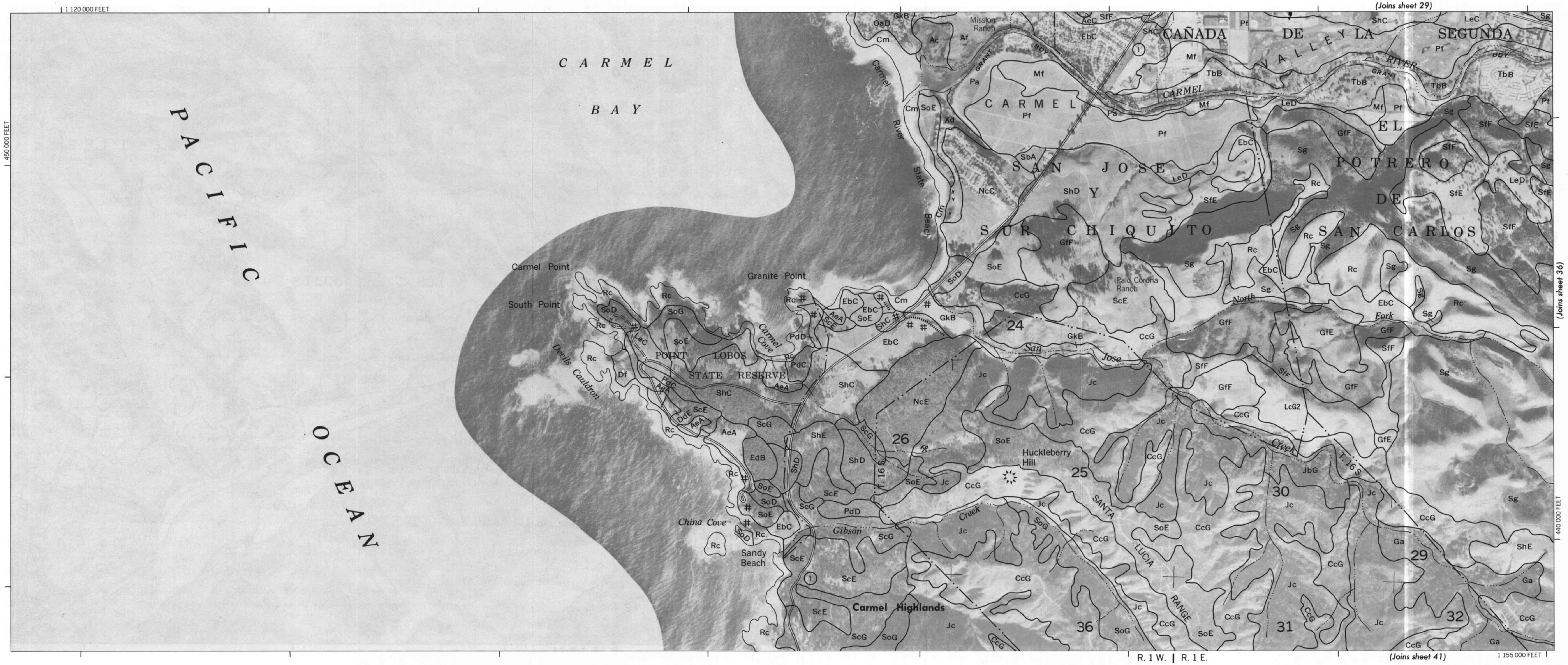
5000 — 4000 — 3000 — 2000 — 1000 — 0 — 5000 — 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

35

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

MONTEREY COUNTY, CALIFORNIA NO. 35

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

36
N

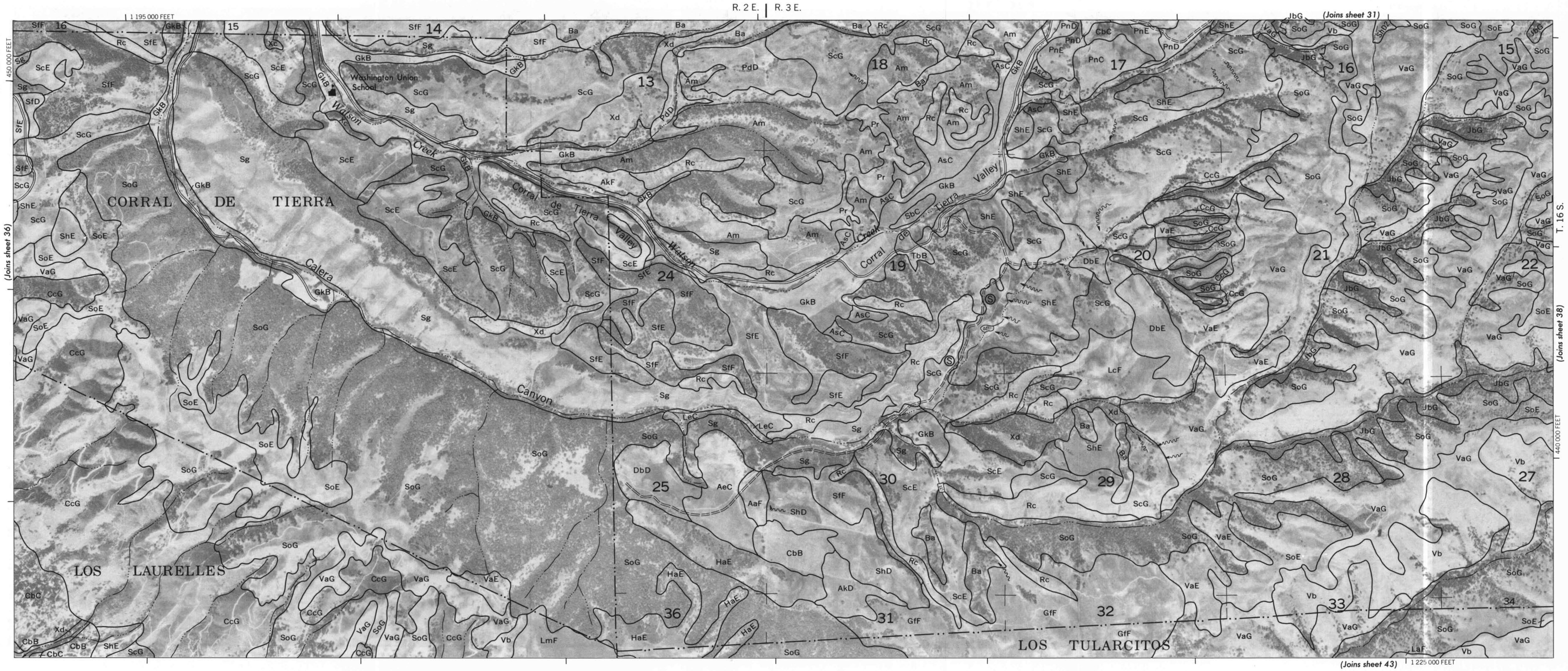
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24 000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA NO. 36



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

MONTEREY COUNTY, CALIFORNIA NO. 37

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 38

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA NO. 38

N

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

MONTEREY COUNTY, CALIFORNIA NO. 39

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

40

N

1 ¾ ½ ¼ 0 1 2 Miles

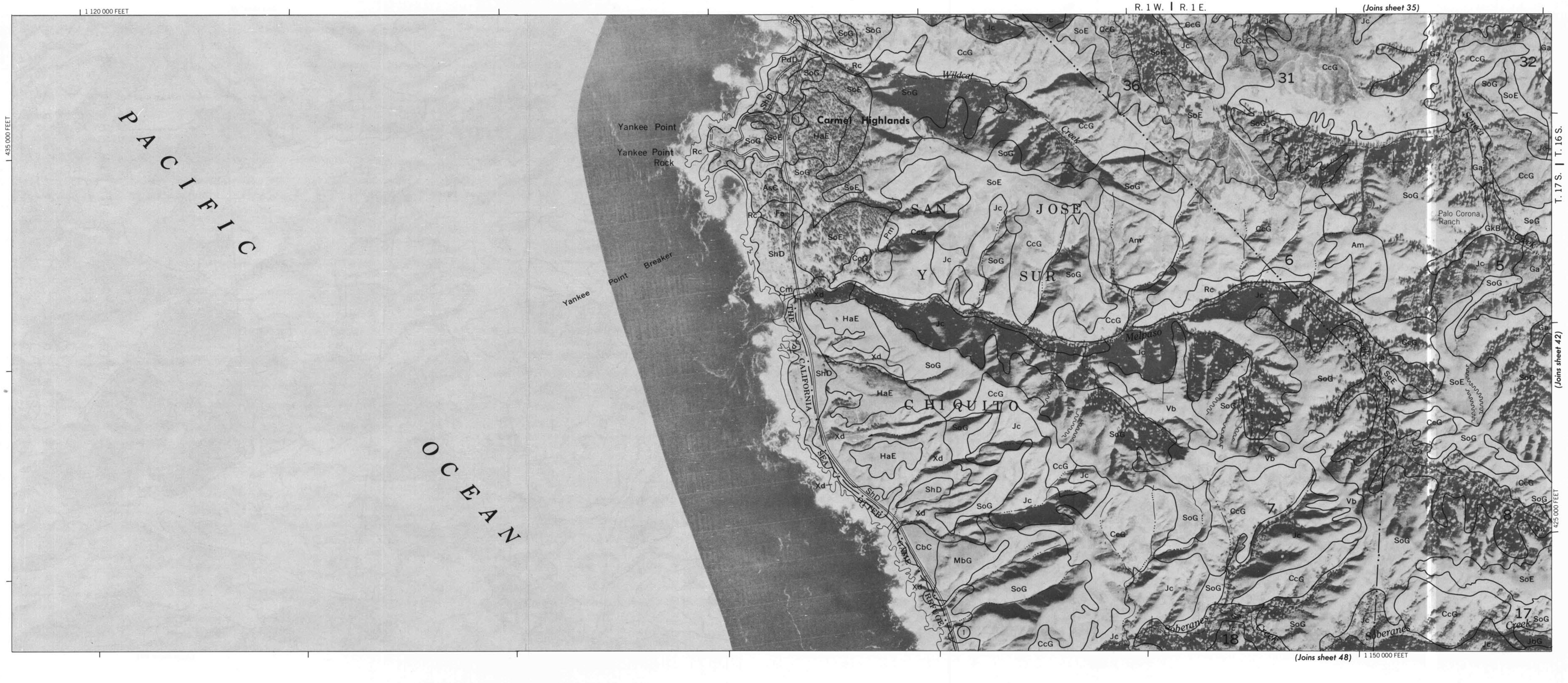
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA NO. 40

N



MONTEREY COUNTY, CALIFORNIA NO. 41

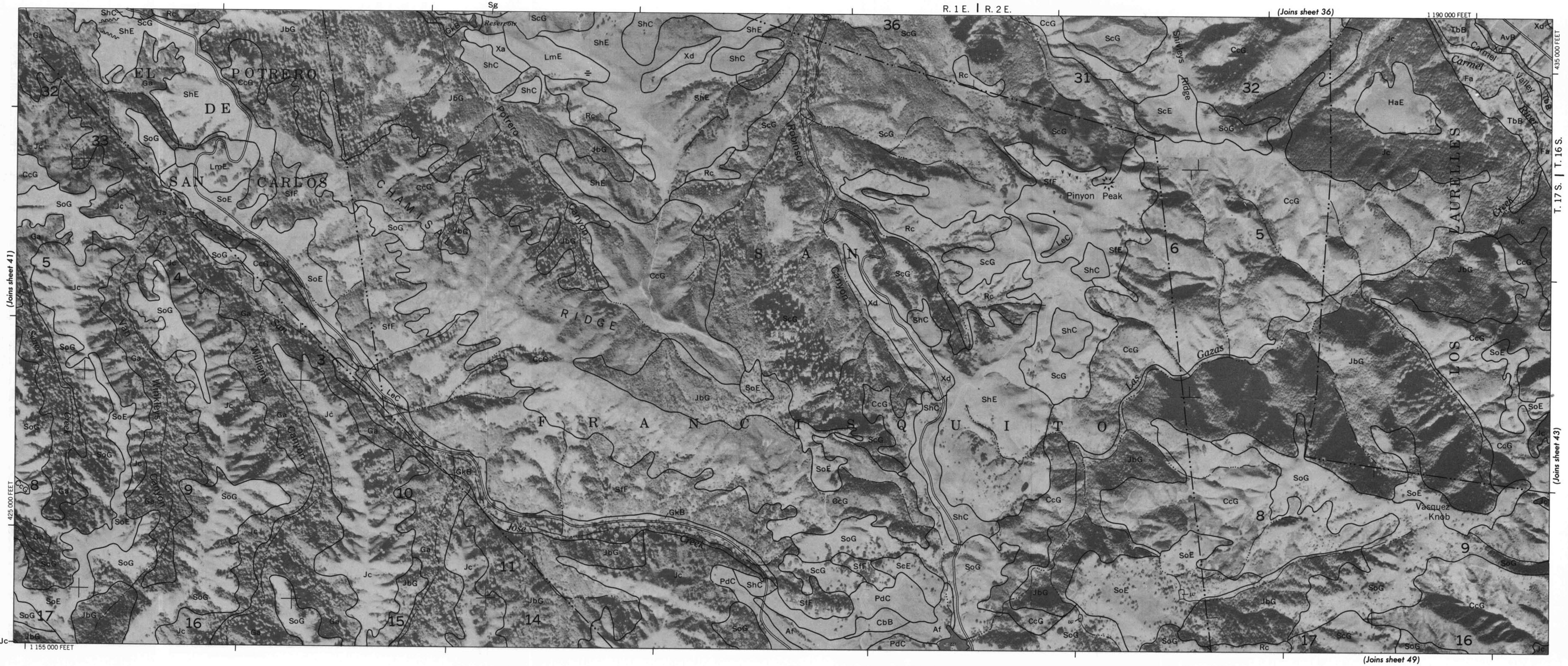
This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

42
N



Scale 1:24000

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

MONTEREY COUNTY, CALIFORNIA NO. 43

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

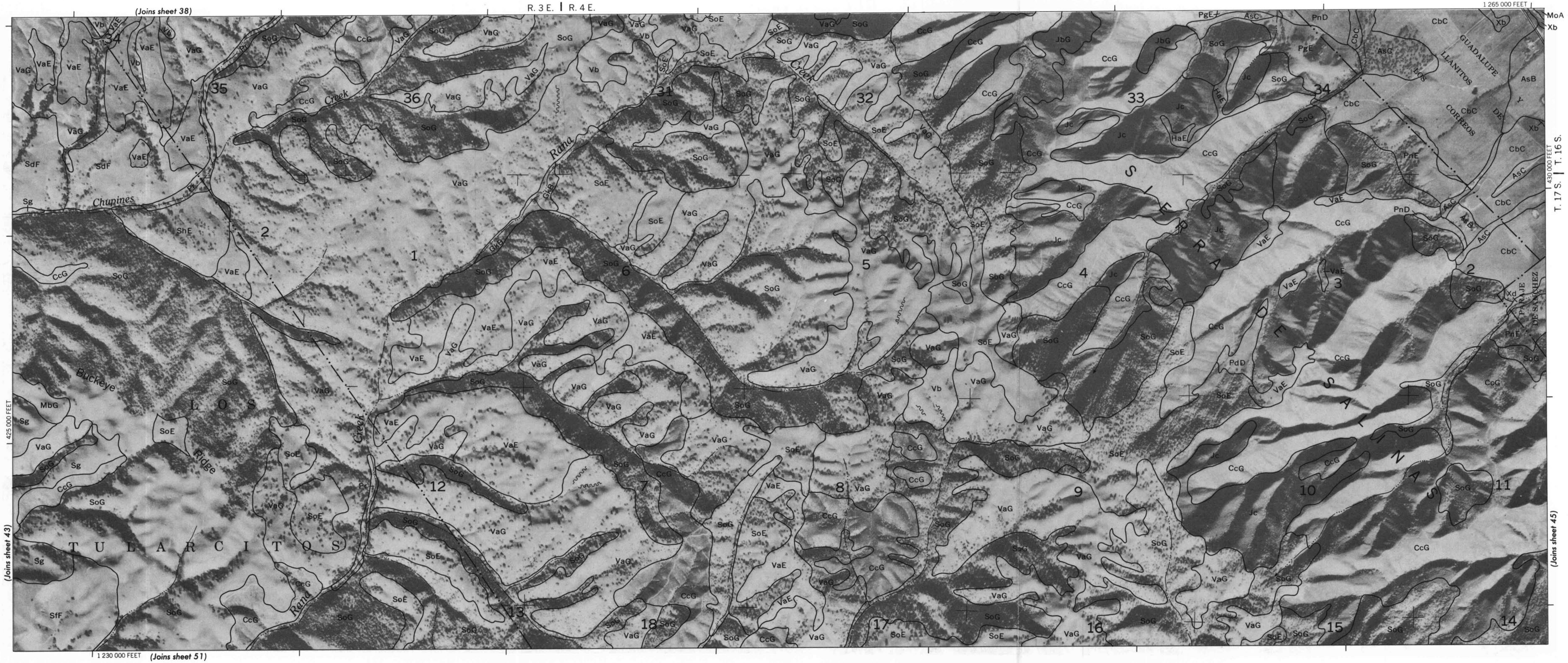
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10 000 Feet

Scale 1:24 000

N

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 44



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10 000 Feet

Scale 1:24 000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

Scale 1:24 000

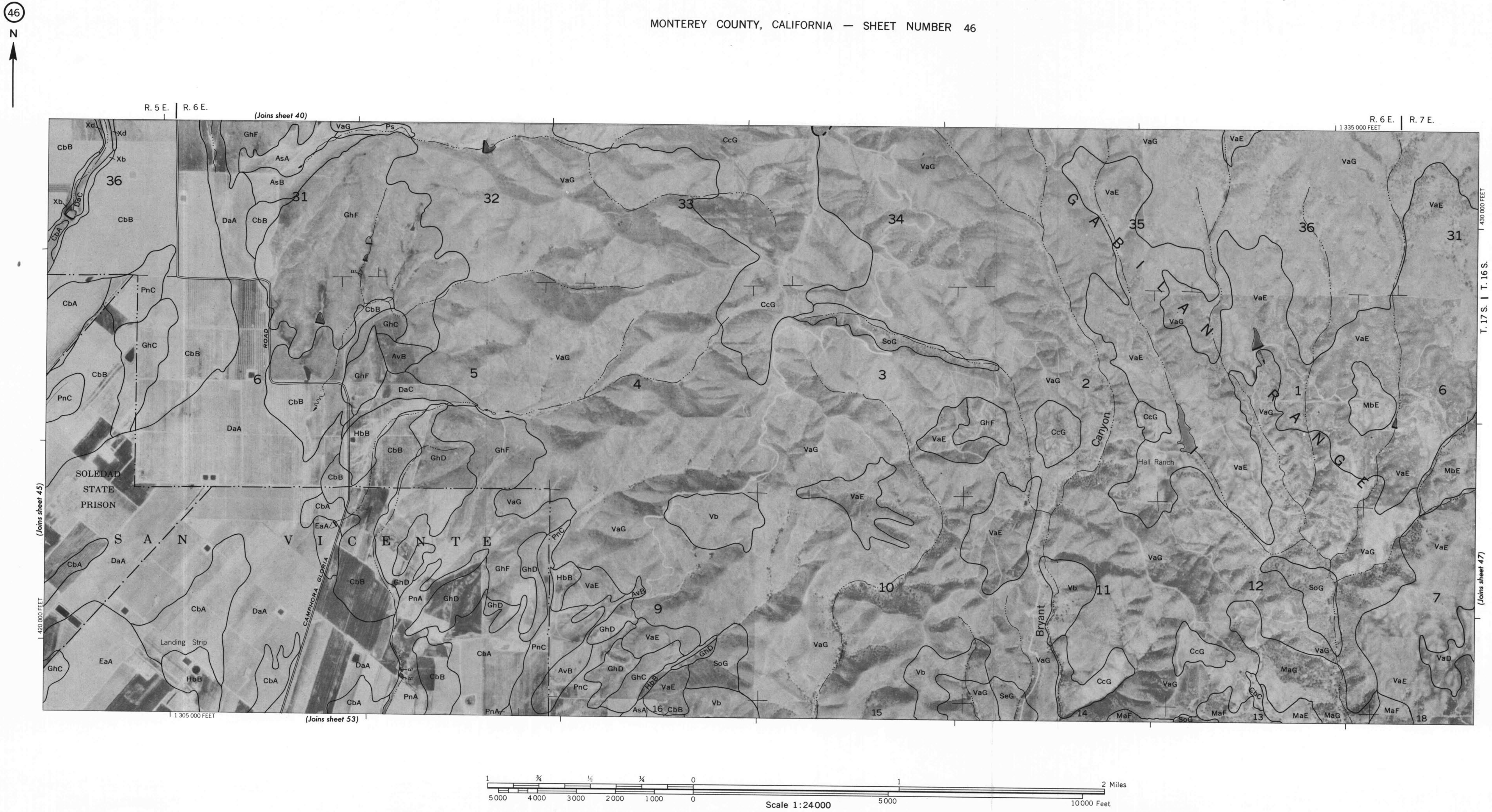
1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 10 000 Feet

MONTEREY COUNTY, CALIFORNIA NO. 45

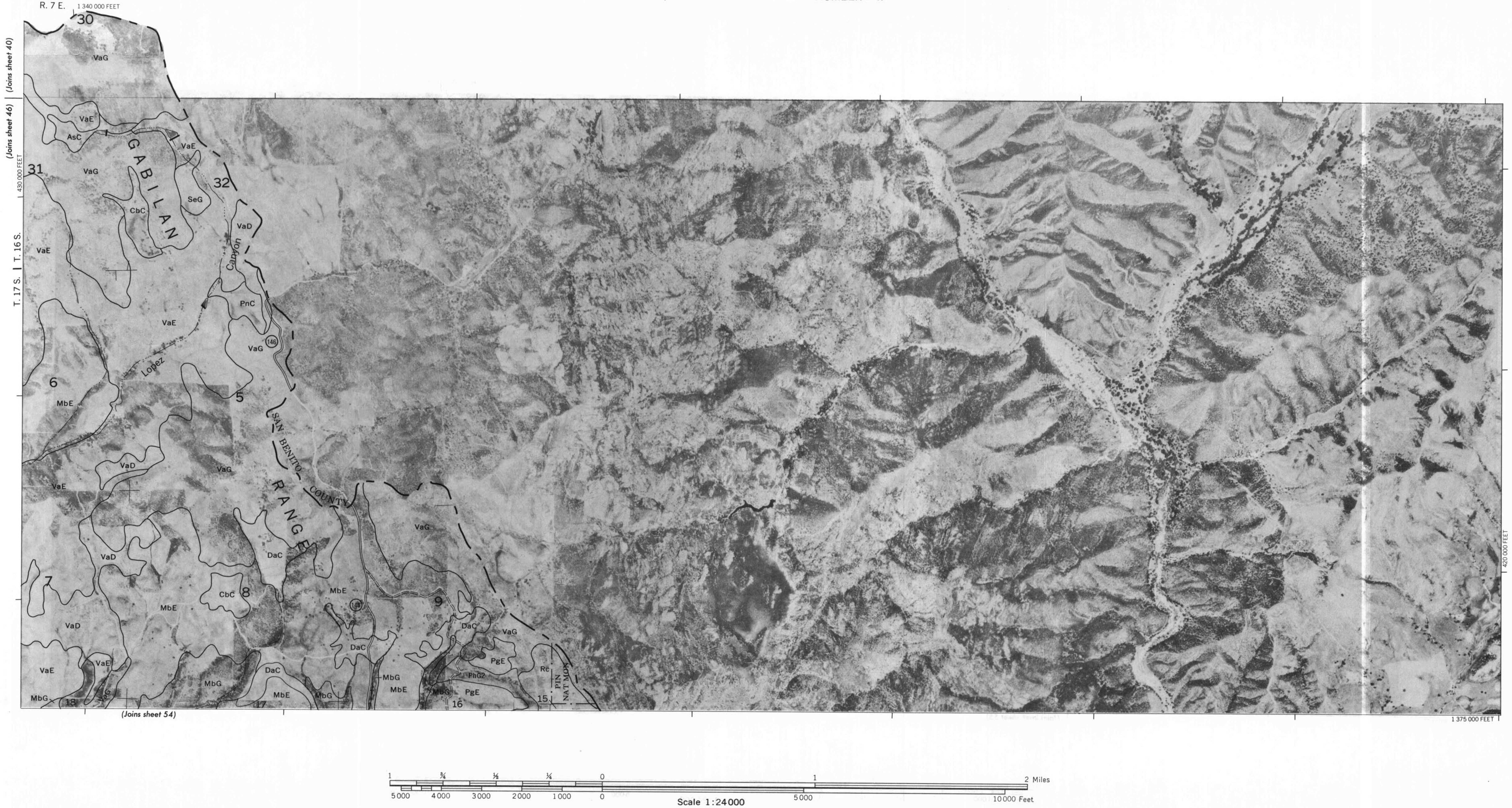
This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 46



This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

47

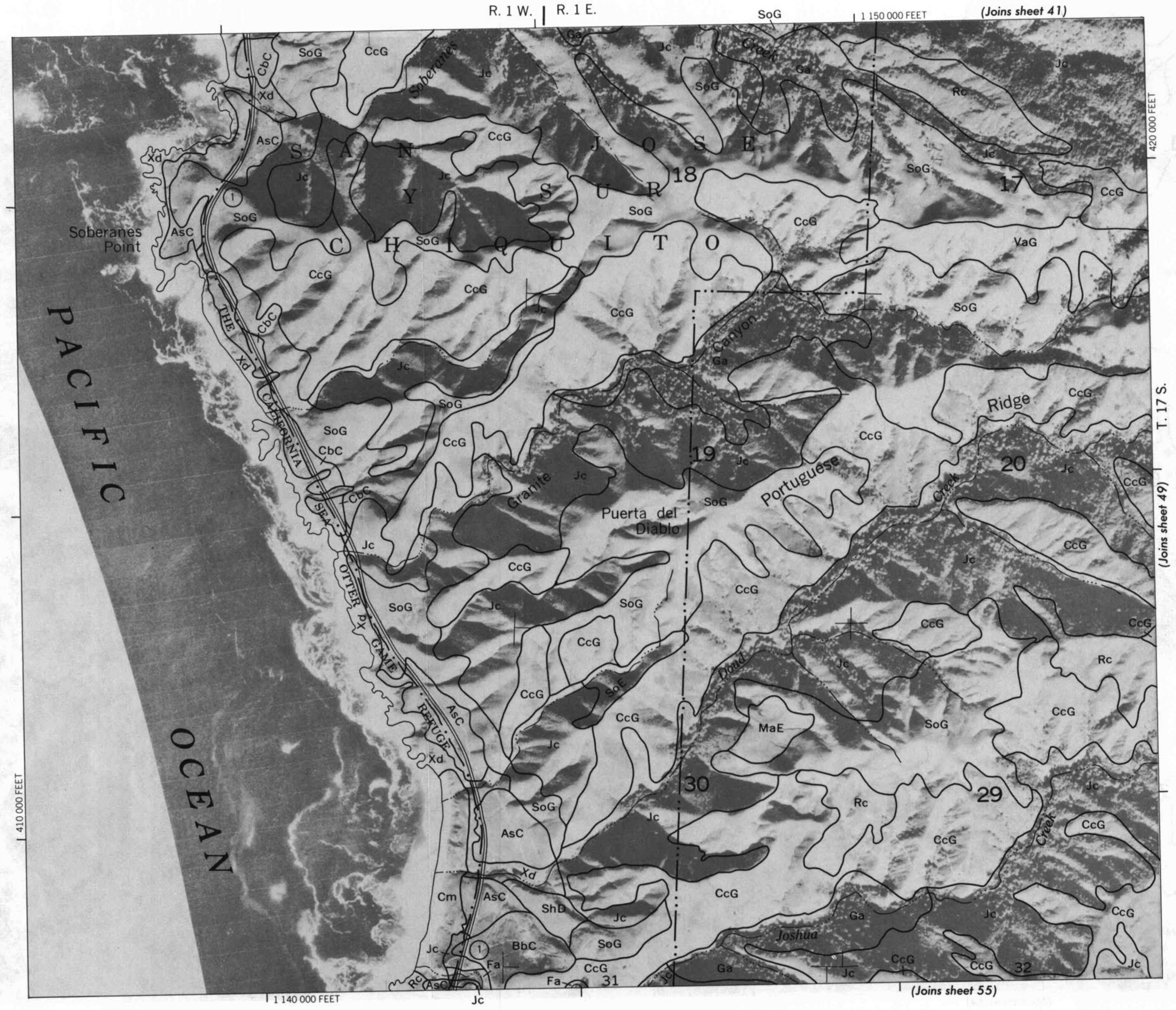


MONTEREY COUNTY, CALIFORNIA NO. 47

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 48



1 ¾ ½ ¼ 0 1 2 Miles

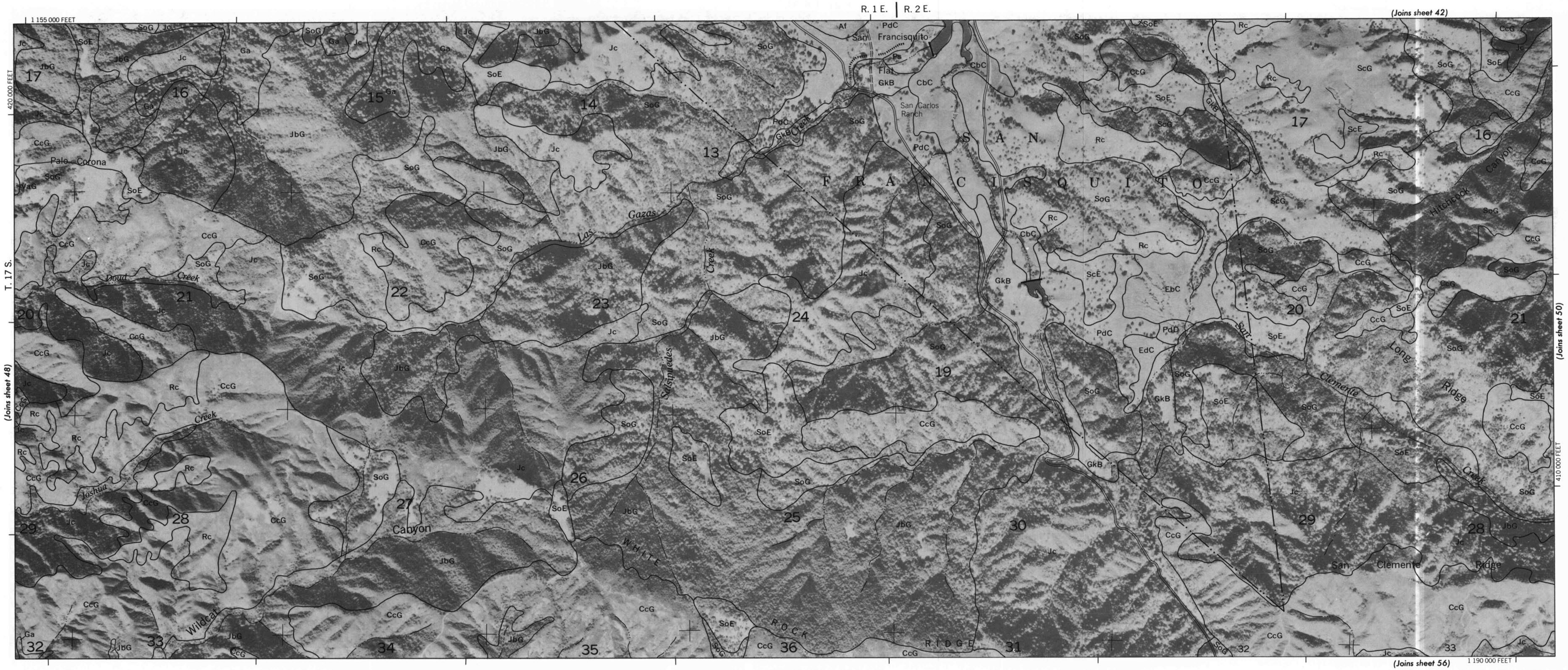
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA NO. 48

N



1 ¾ ½ ¼ 0 1 2 Miles

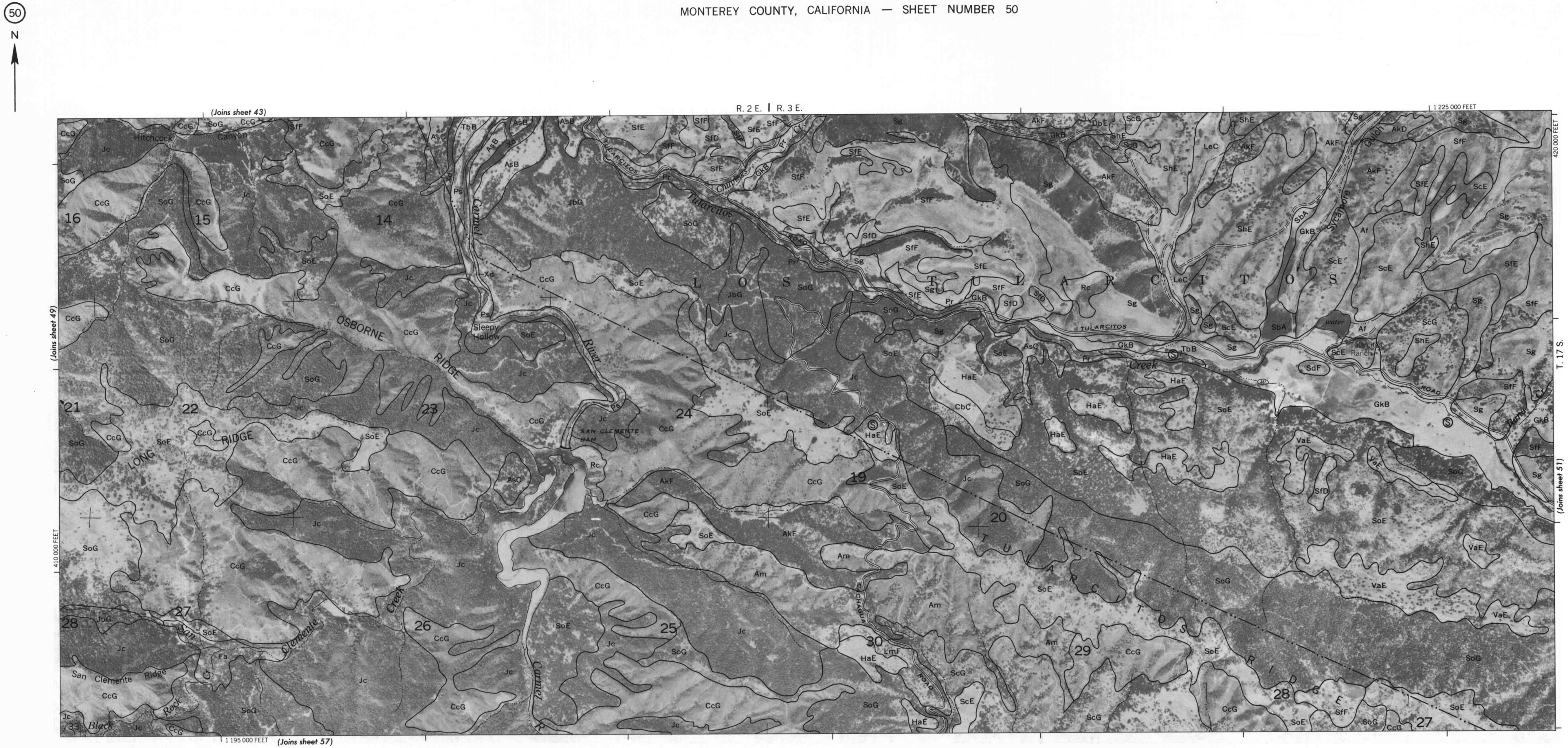
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

MONTEREY COUNTY, CALIFORNIA NO. 49

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 50



Scale 1:24 000

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

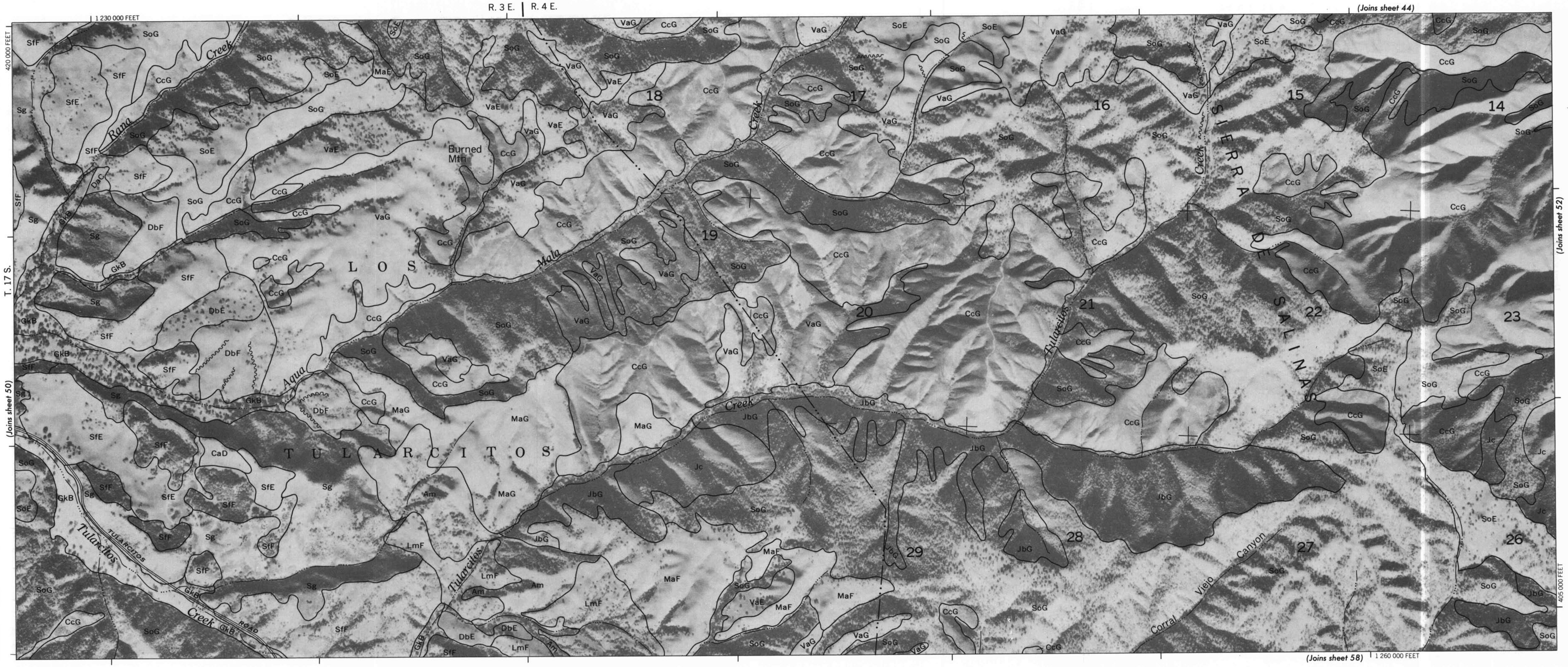
This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

51

N

MONTEREY COUNTY, CALIFORNIA NO. 51

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA NO. 52

53

N

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA NO. 53

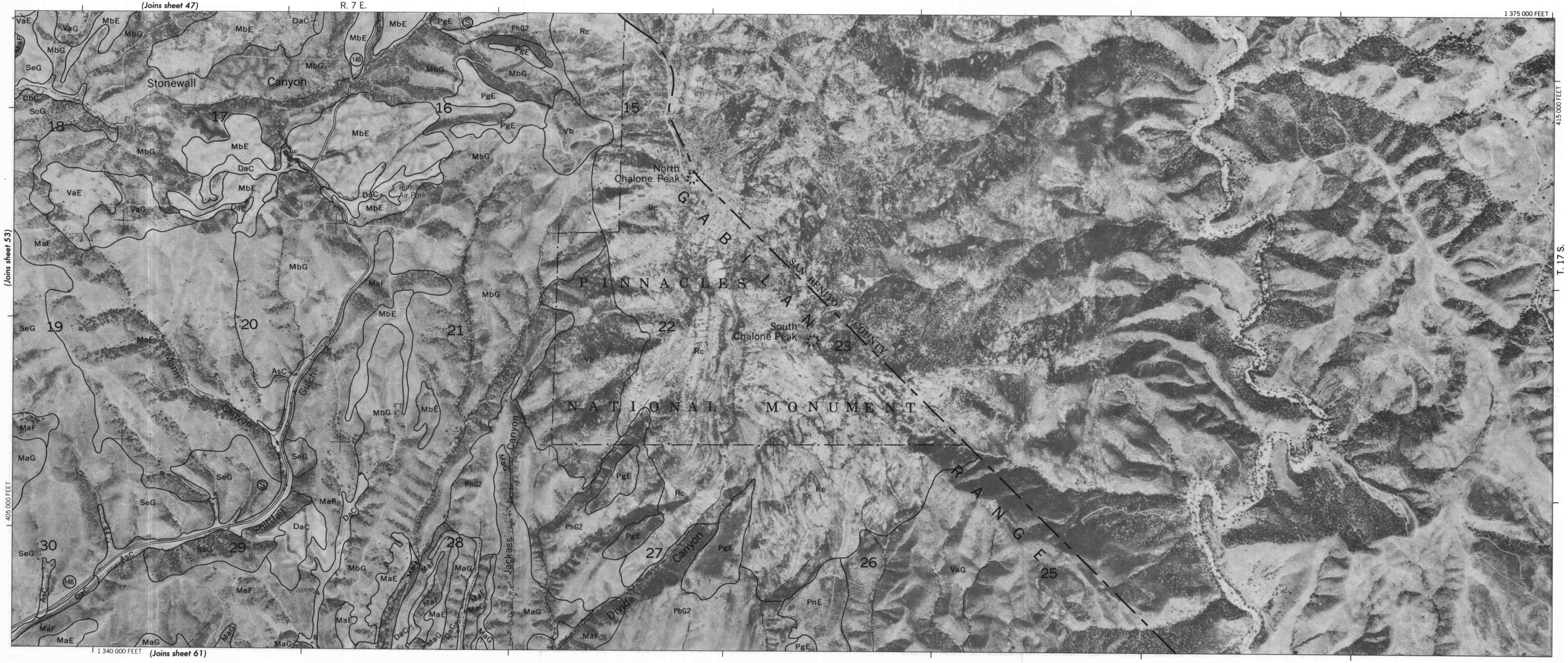
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

N

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 54



1 ¾ ½ ¼ 0 1 2 Miles

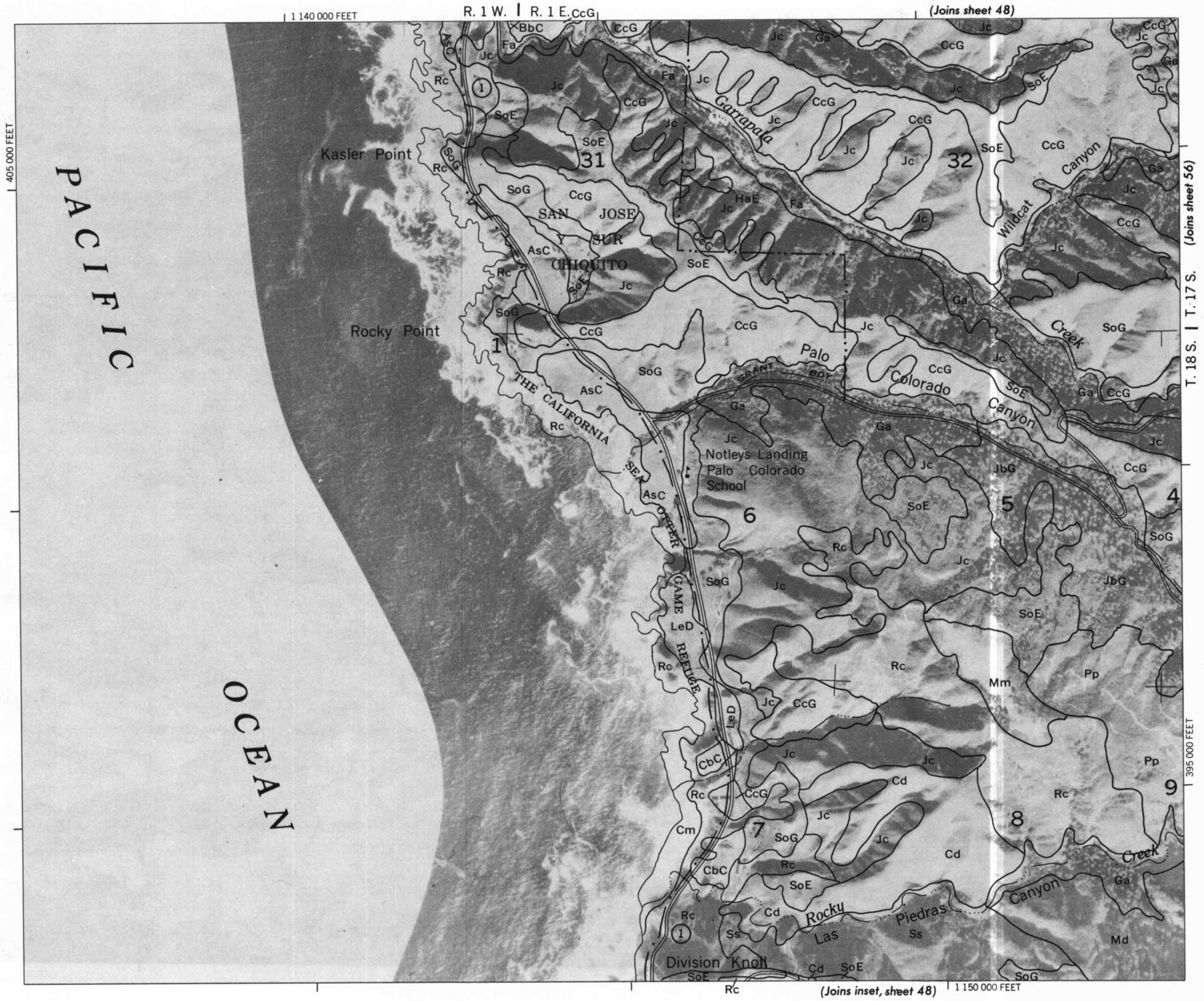
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

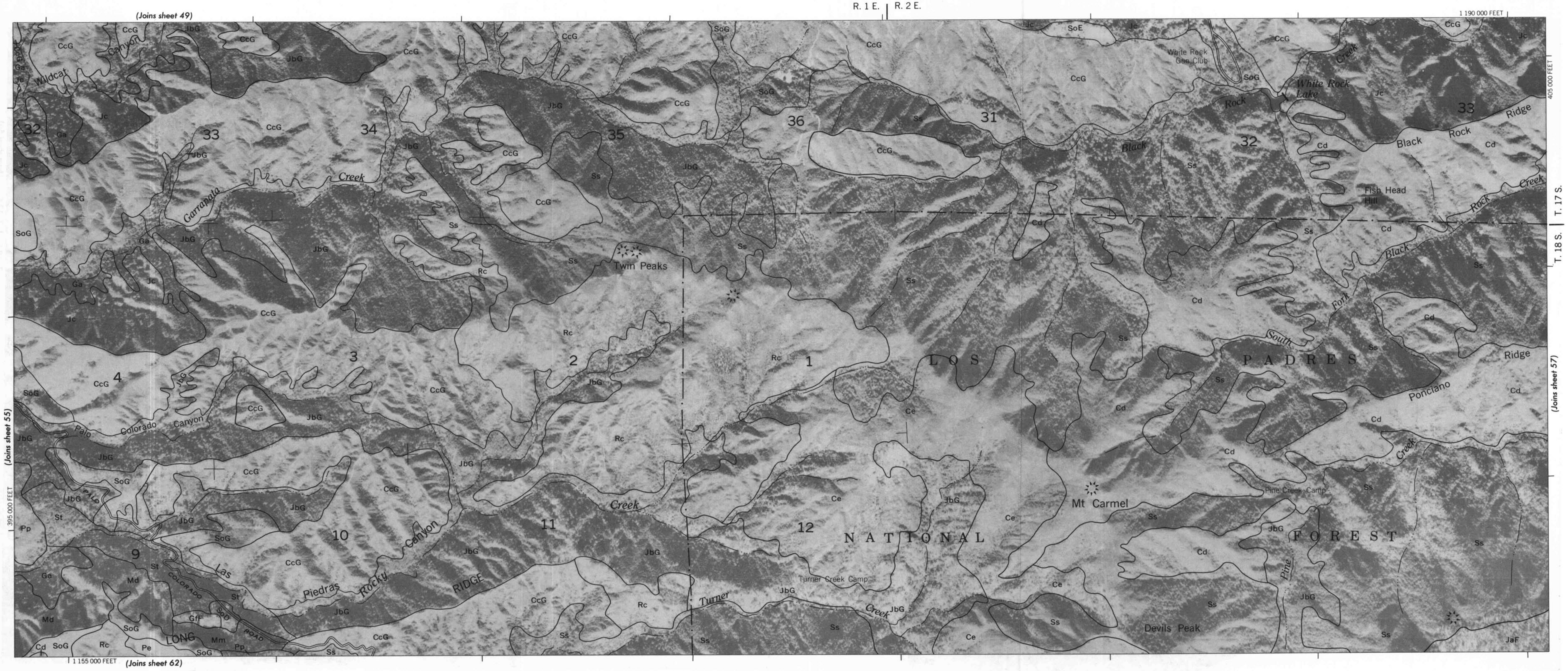
This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 ¾ ½ ¼ 0 1 2 Miles
5000 4000 3000 2000 1000 0 5000 10000 Feet
Scale 1:24000

N

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 56



1 ¾ ½ ¼ 0 1 2 Miles

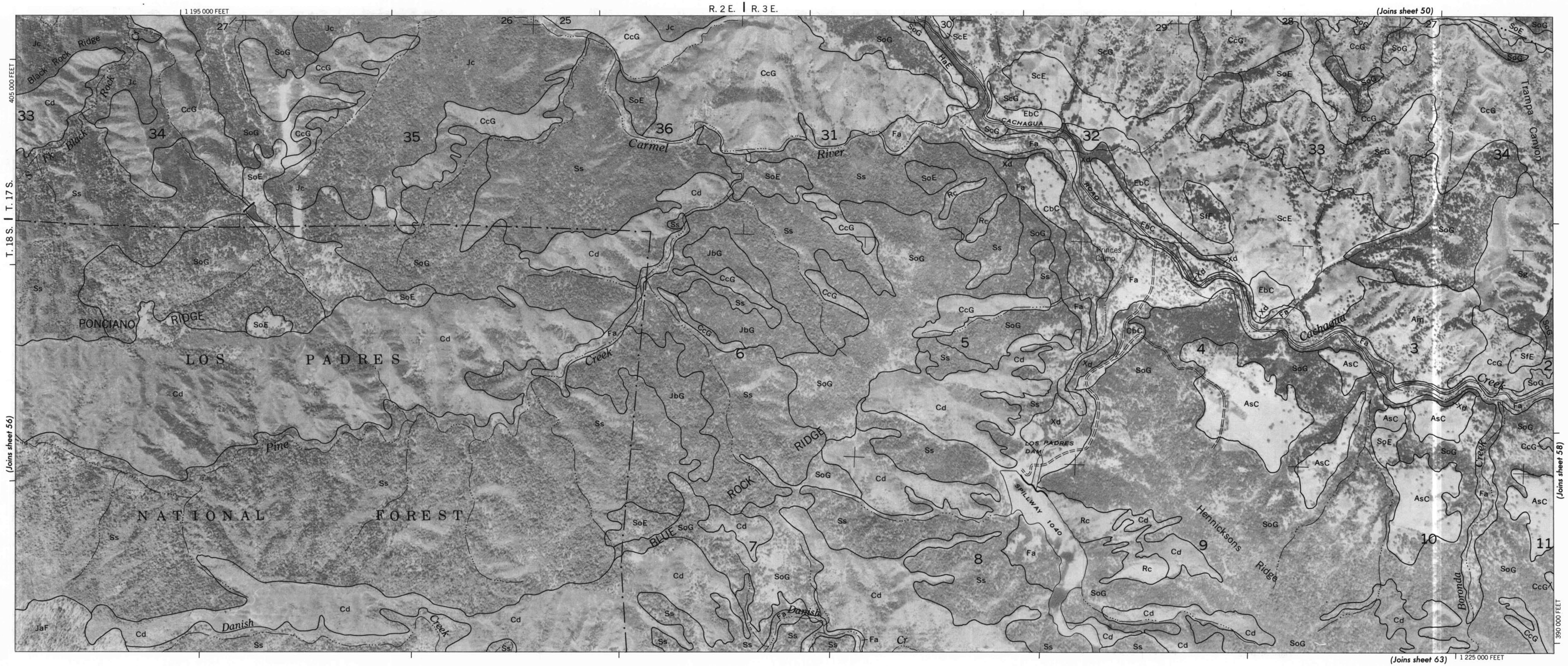
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

57

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

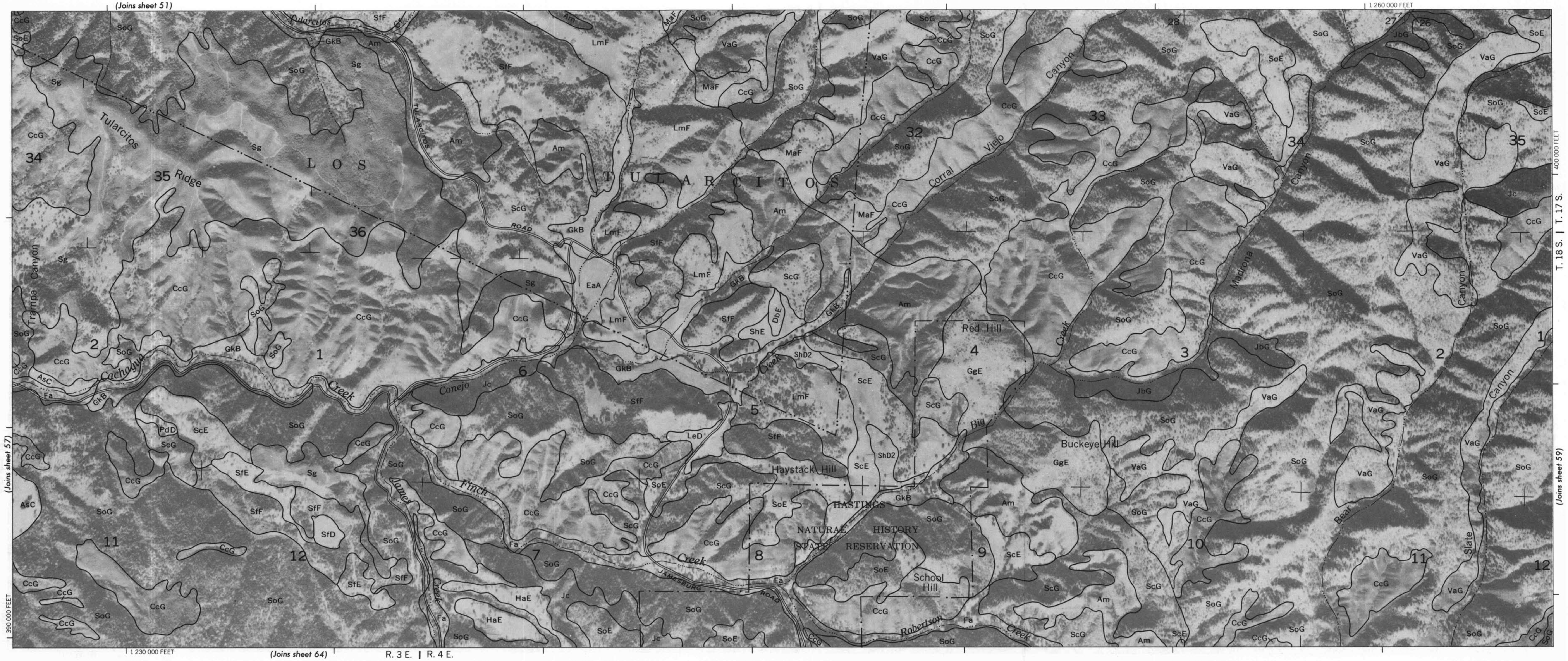
Scale 1:24 000

MONTEREY COUNTY, CALIFORNIA NO. 57

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 58



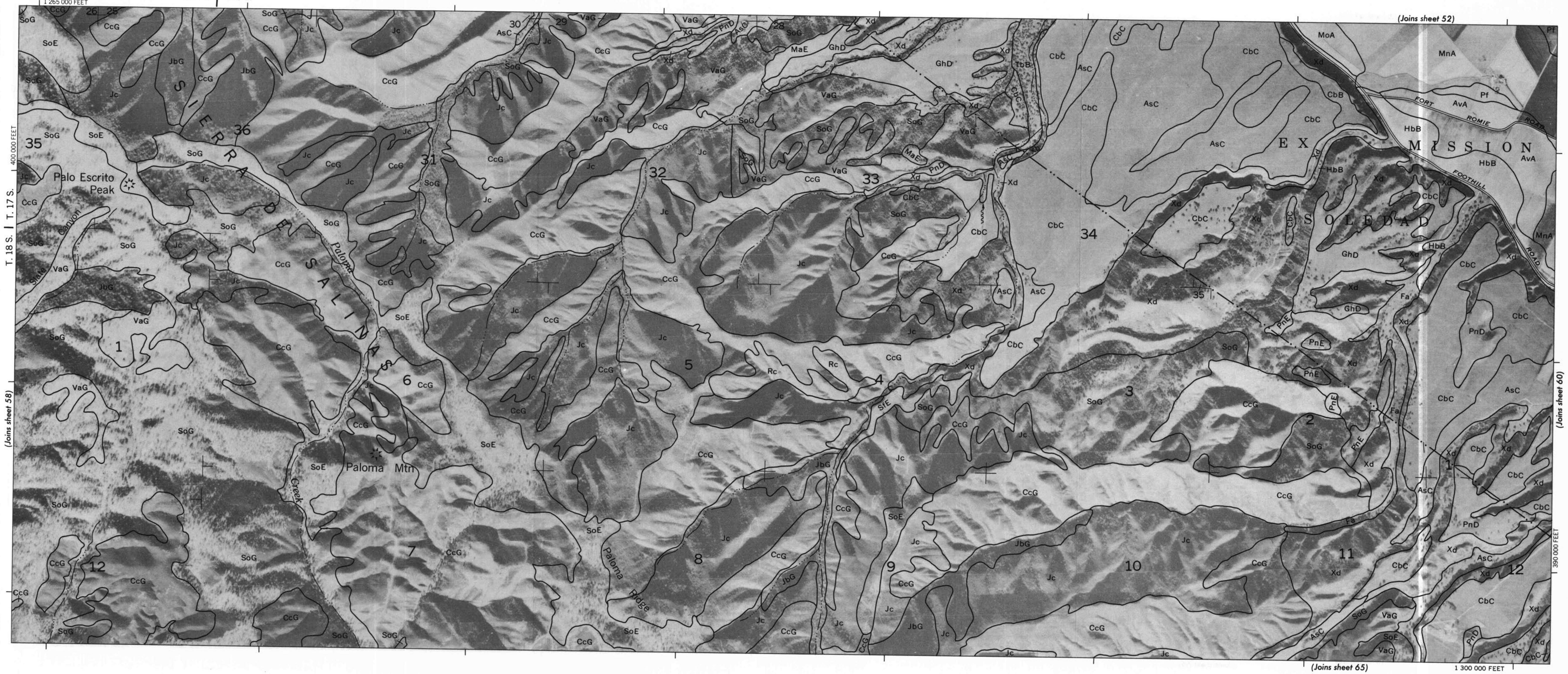
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

MONTEREY COUNTY, CALIFORNIA NO. 59

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 60

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

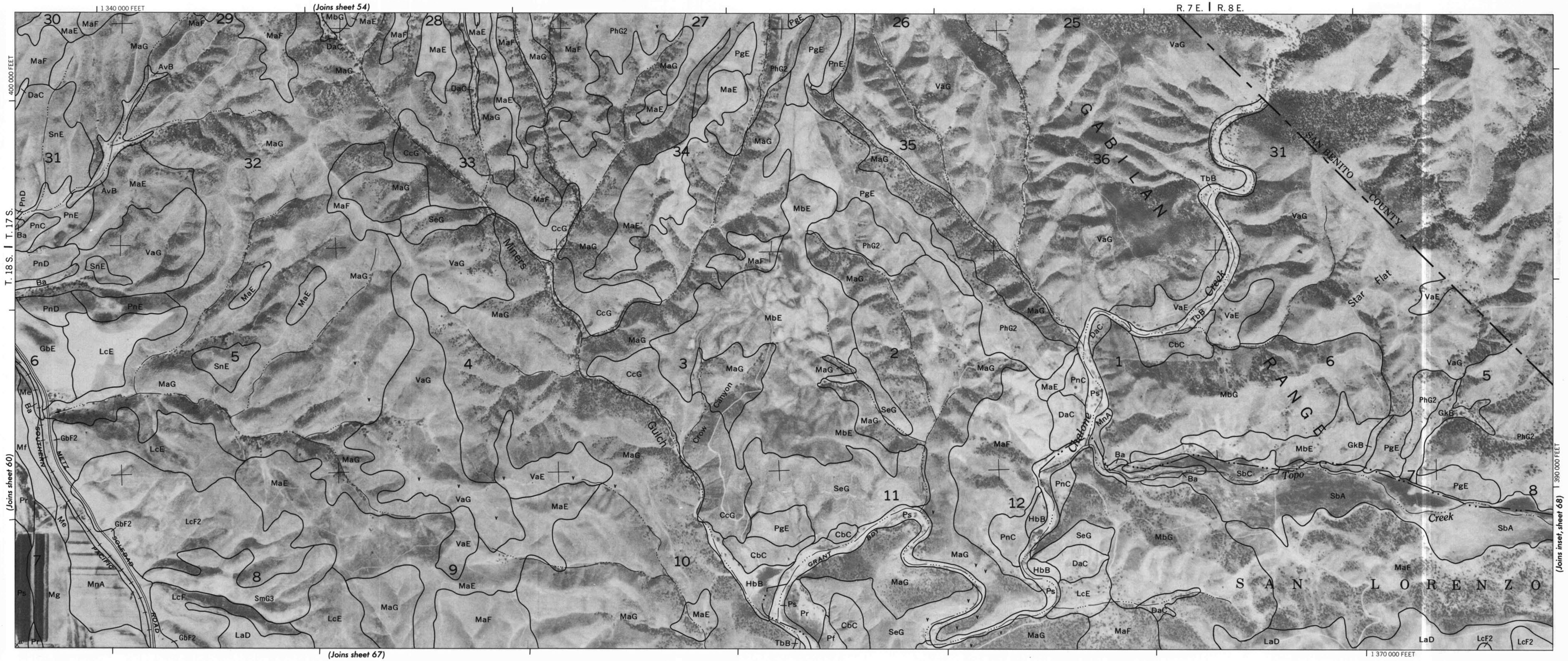
Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA NO. 60

N

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



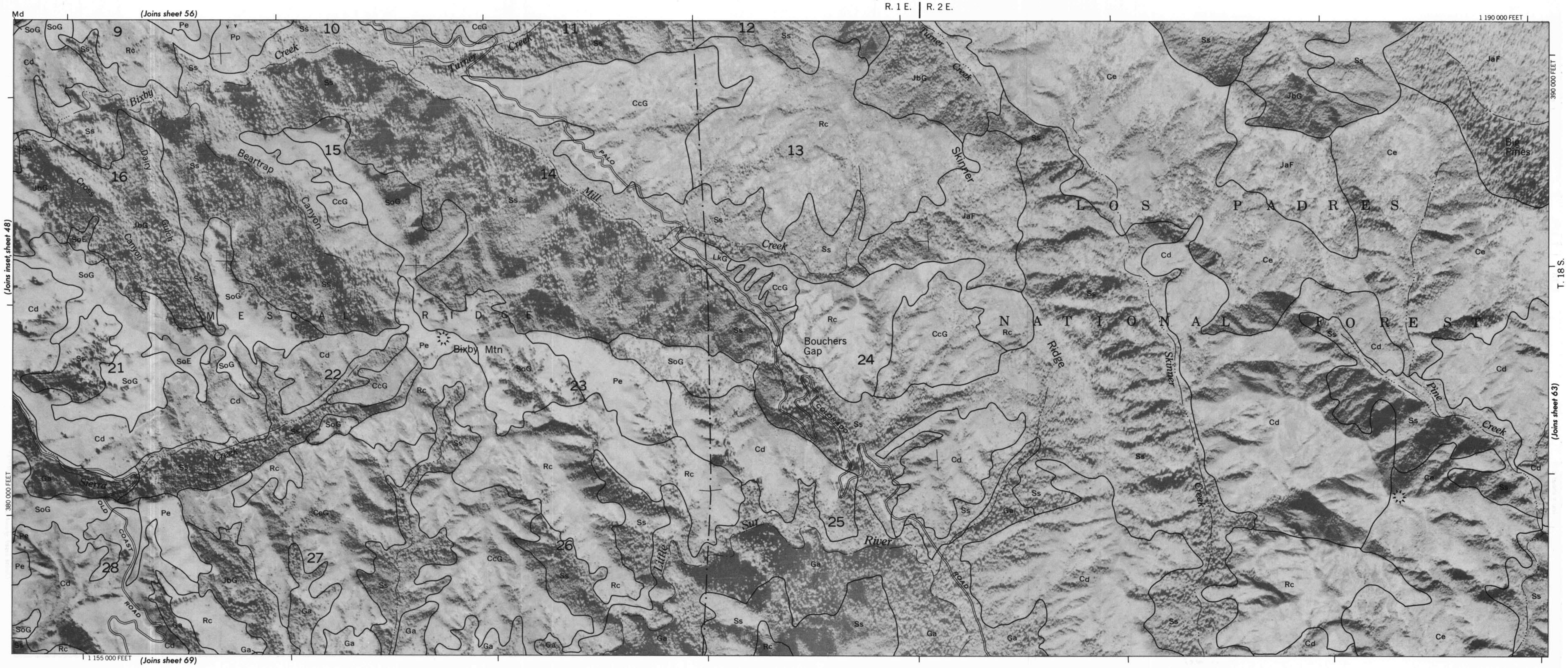
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24 000

N

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 62



(Joins sheet 56)

(Joins sheet 69)

1 ¾ ½ ¼ 0 1 2 Miles

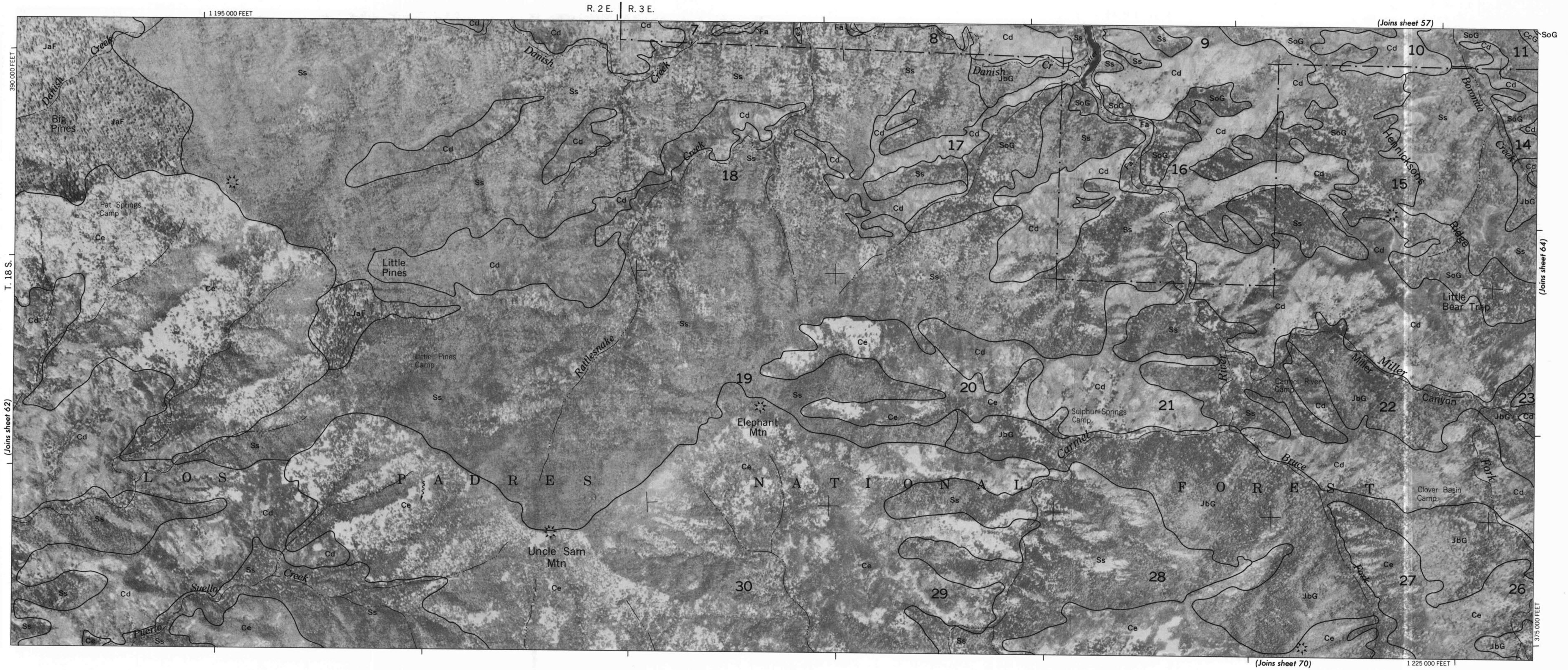
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

63

N



Scale 1:24 000

1 ¾ ½ ¼ 0 1 2 Miles

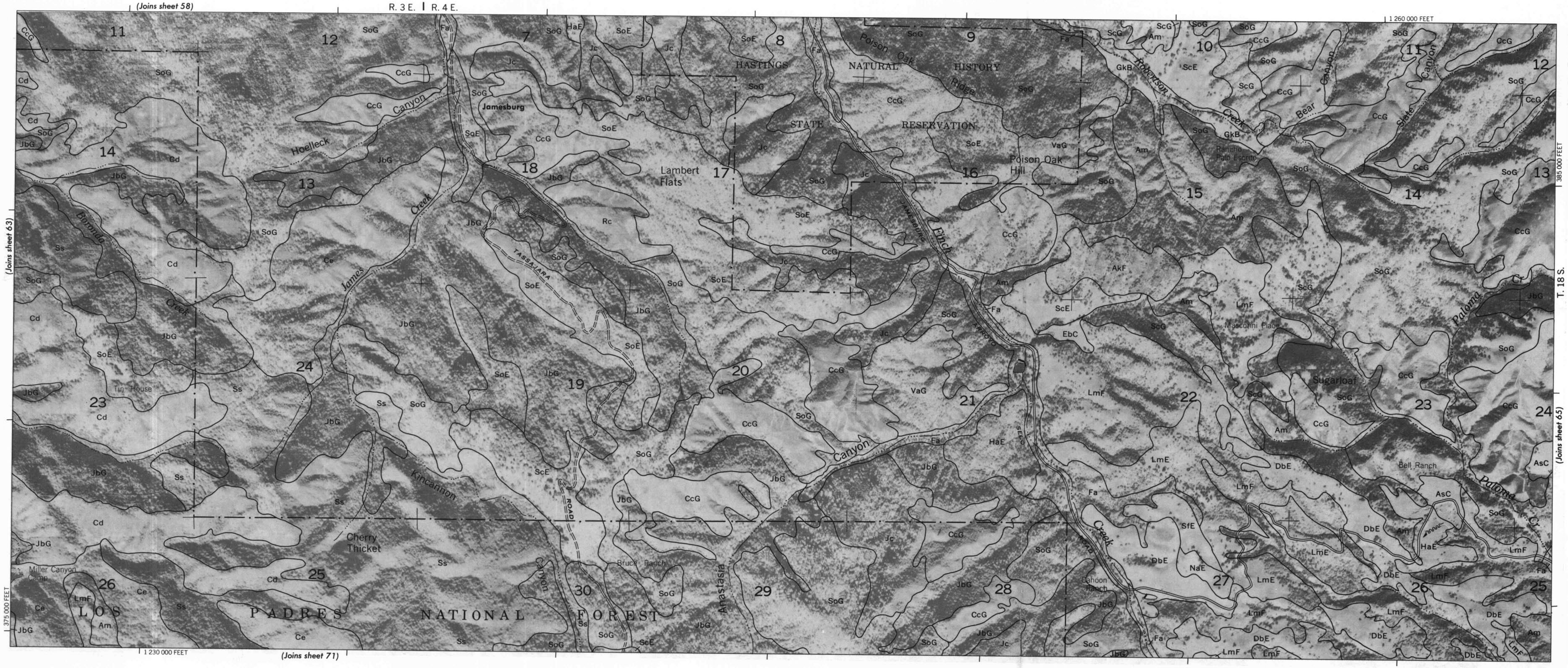
5 000 4 000 3 000 2 000 1 000 0 5 000 10 000 Feet

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA NO. 63

N

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 64



1 3/4 1/2 1/4 0 1 2 Miles

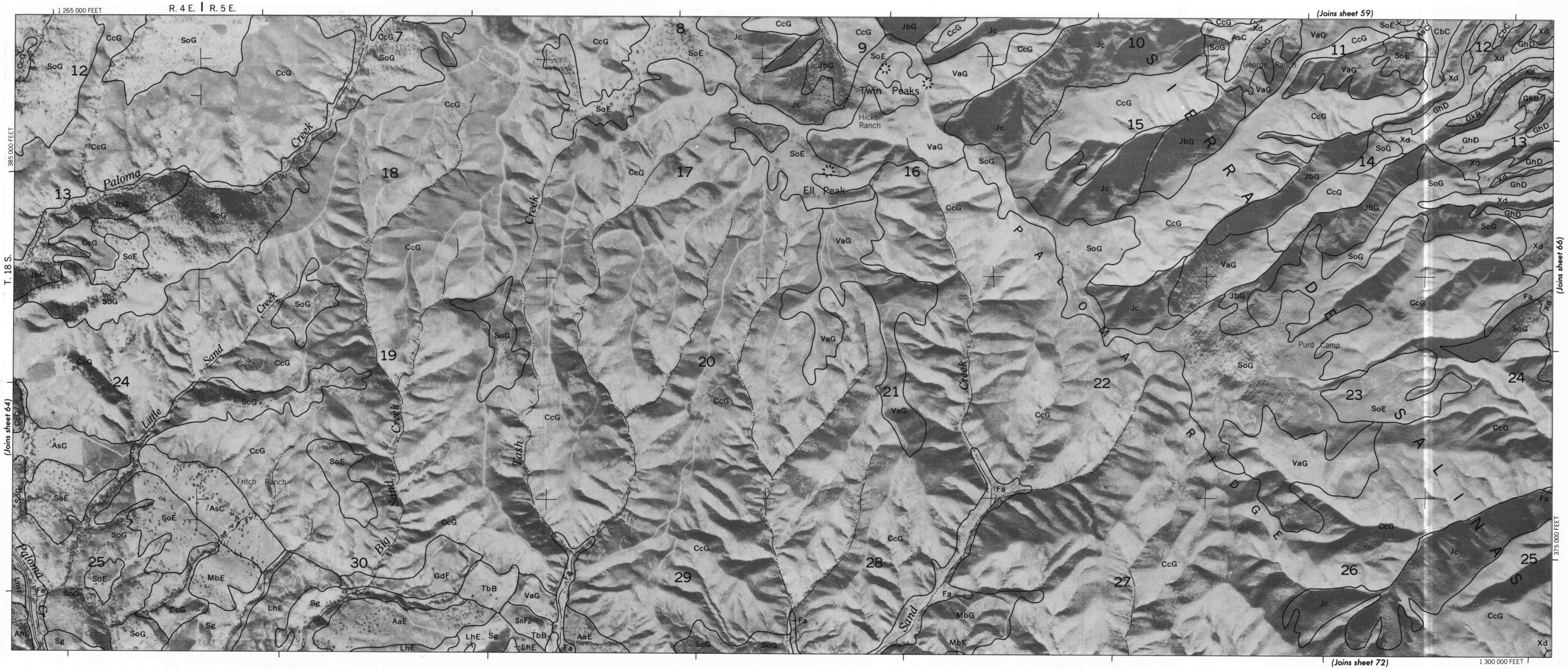
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA NO. 64

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 66

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

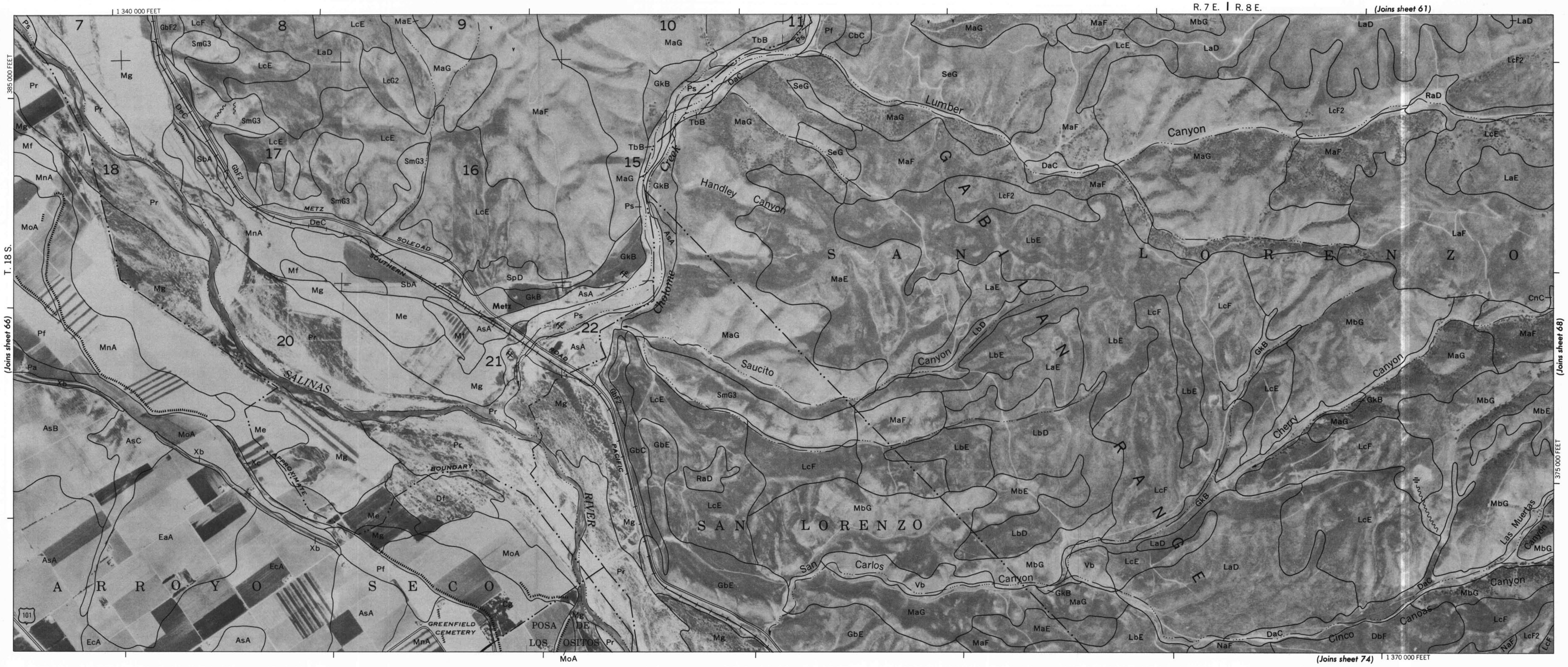
Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

MONTEREY COUNTY, CALIFORNIA NO. 67

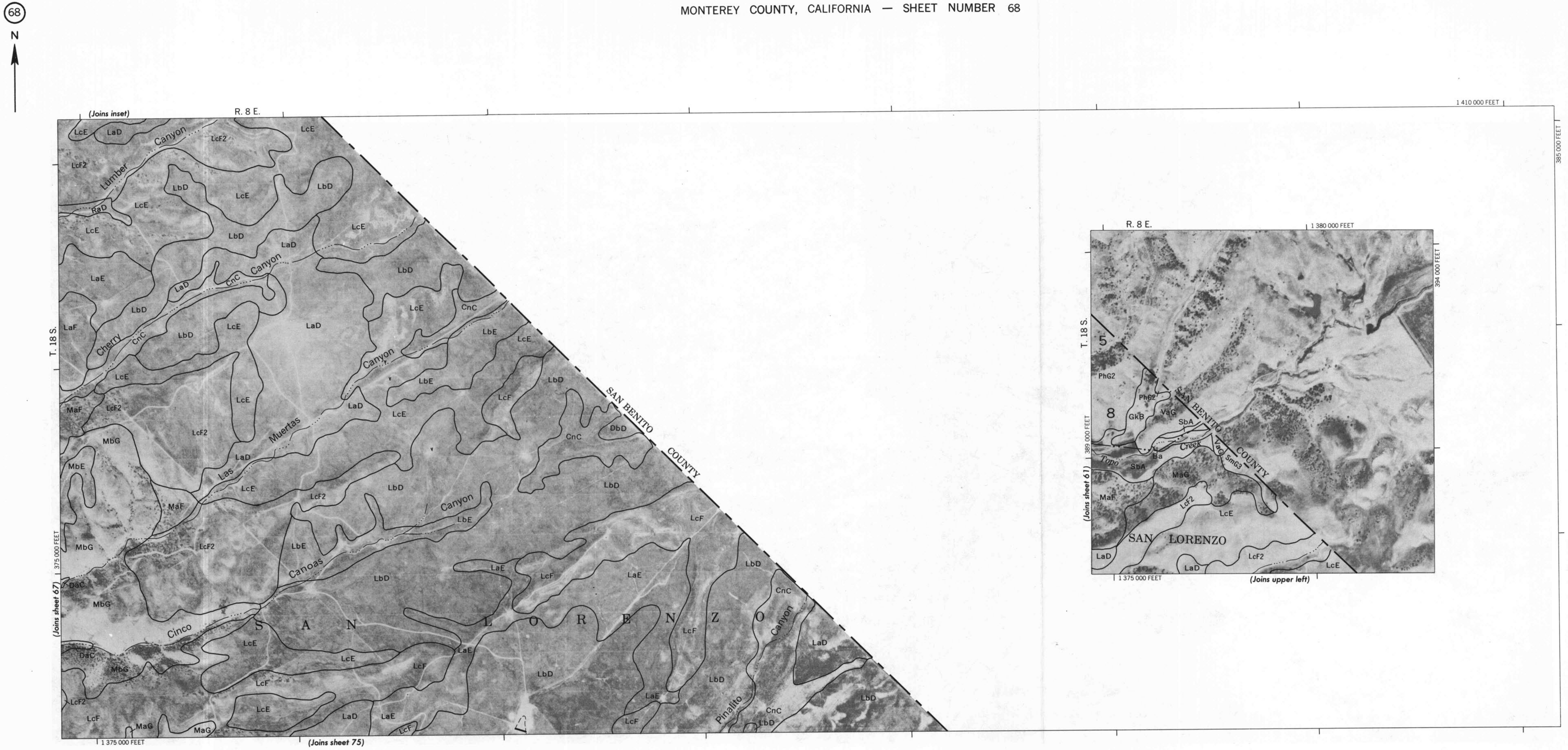
This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000



1 ¾ ½ ¼ 0 1 2 Miles

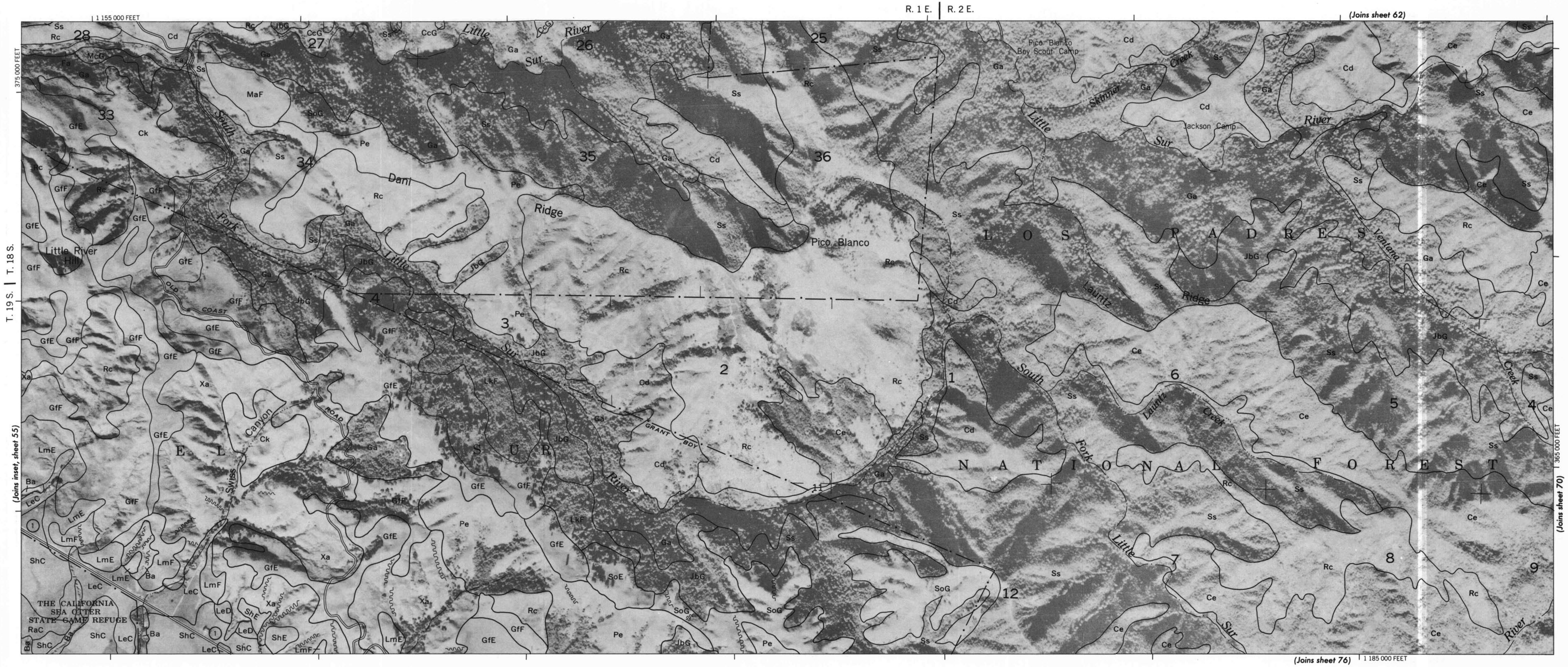
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

69

N



1 ¾ ½ ¼ 0 1 2 Miles

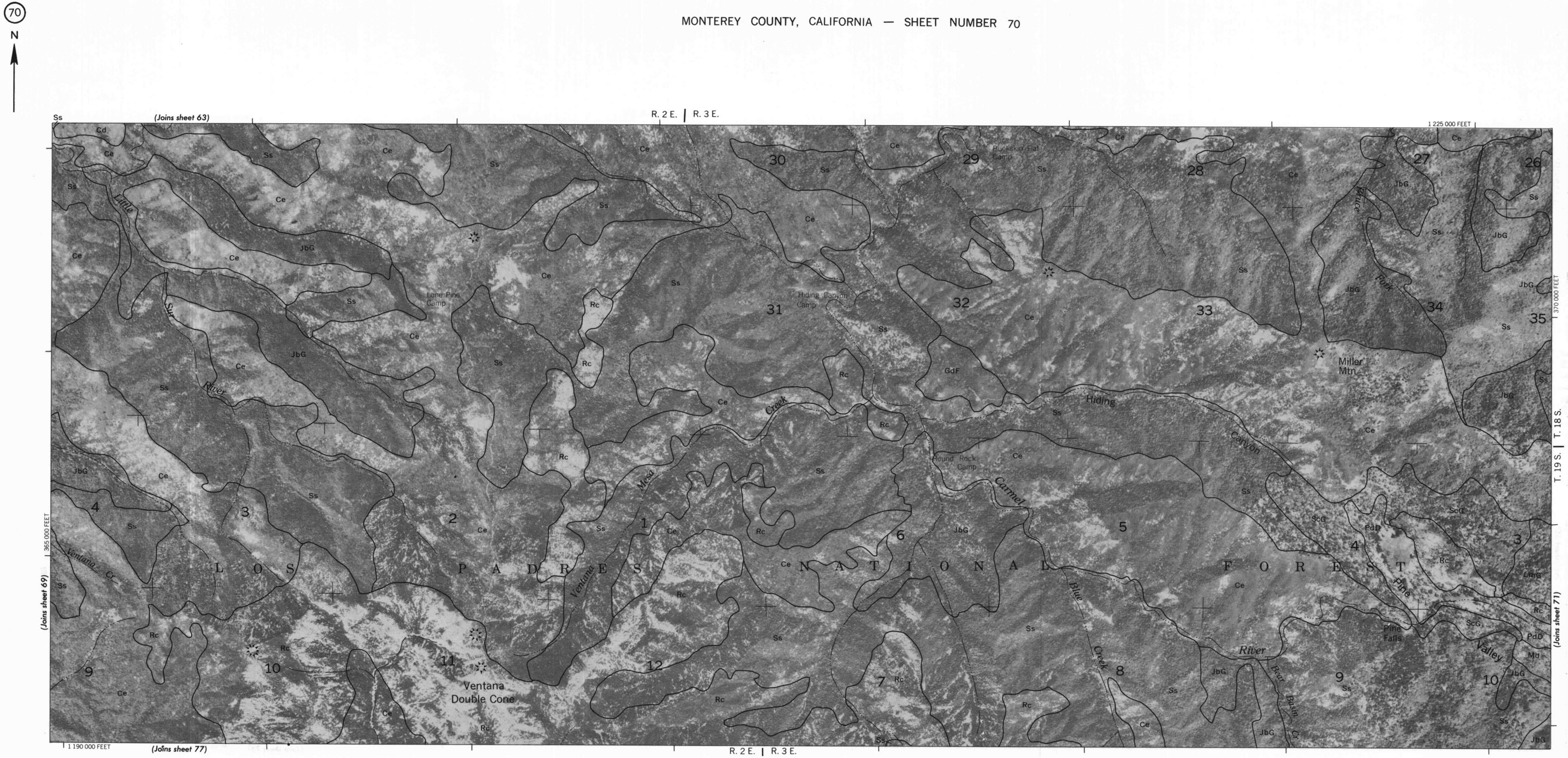
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

MONTEREY COUNTY, CALIFORNIA NO. 69

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 70



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

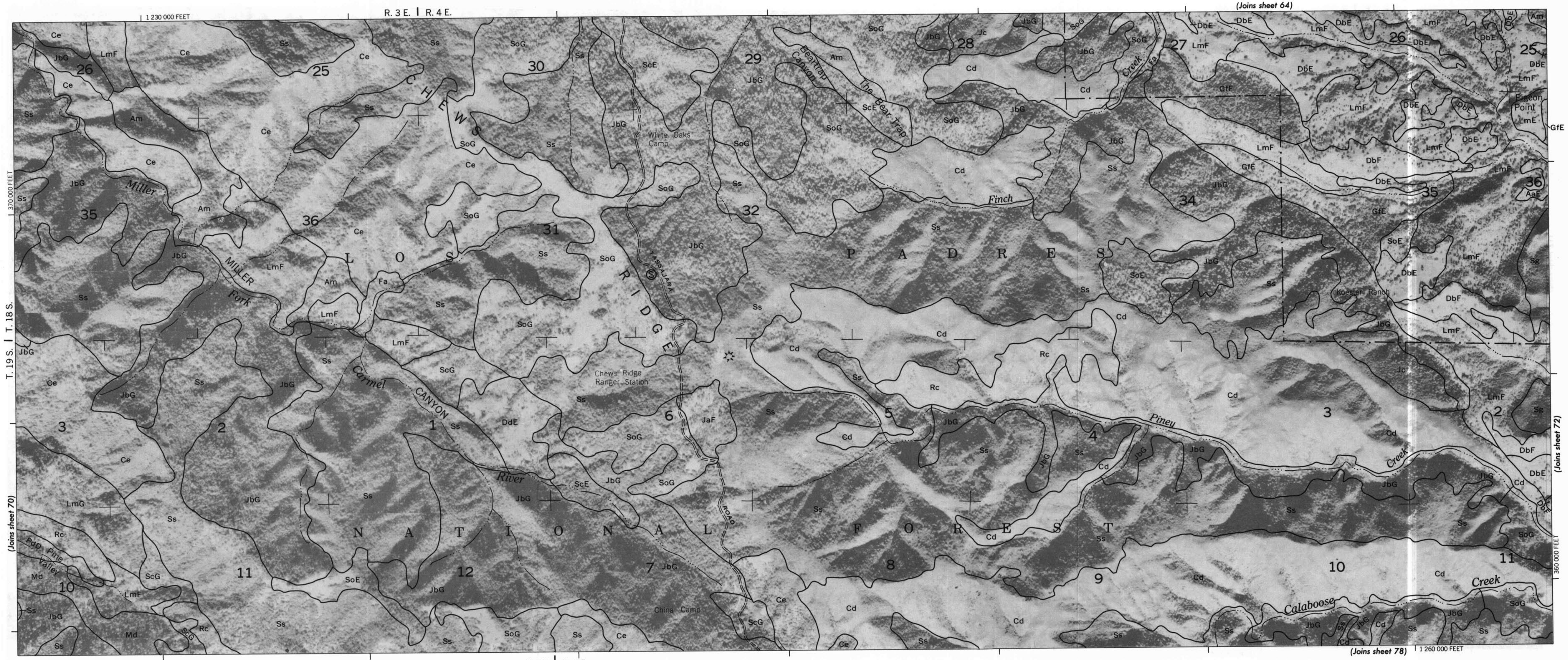
Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

71

N

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



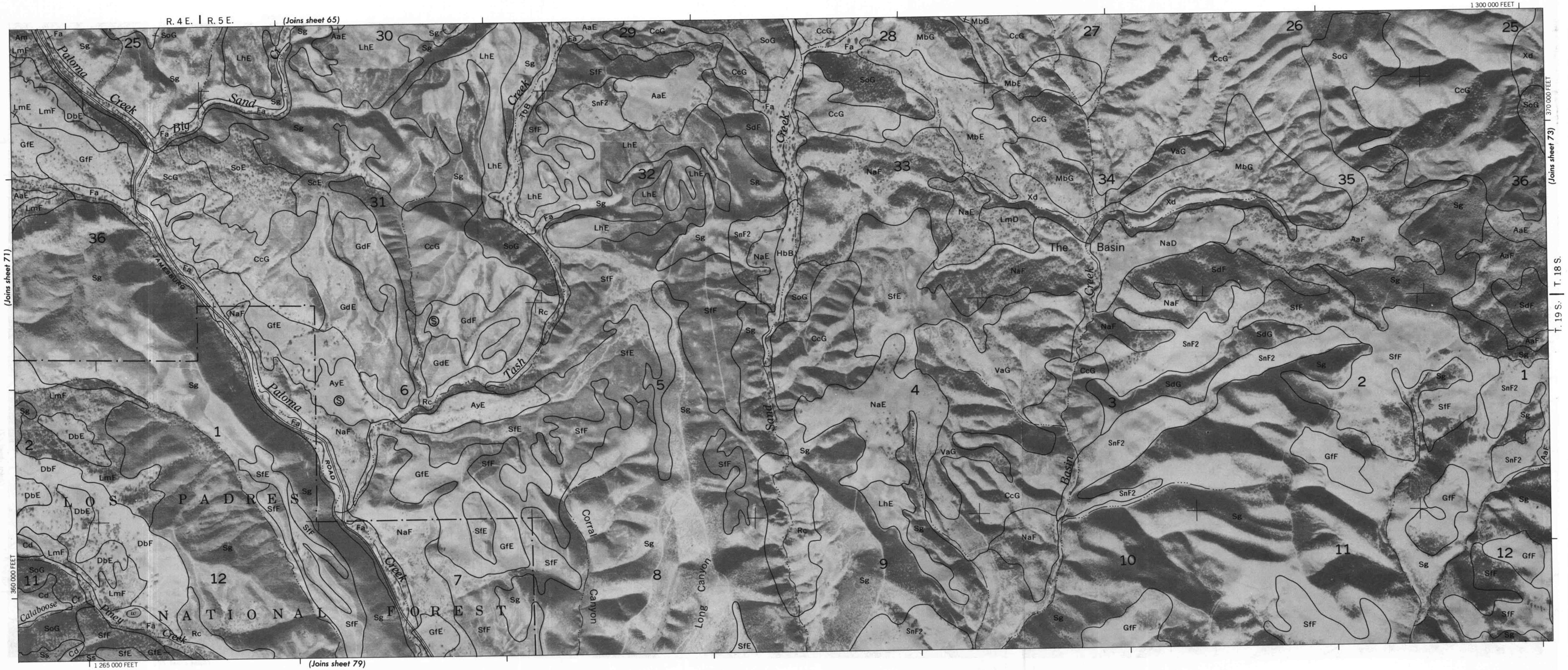
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

N

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 72



Scale 1:24 000

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 10 000 Feet

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

73

N

MONTEREY COUNTY, CALIFORNIA NO. 73

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

N

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

75

N

MONTEREY COUNTY, CALIFORNIA NO. 75

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

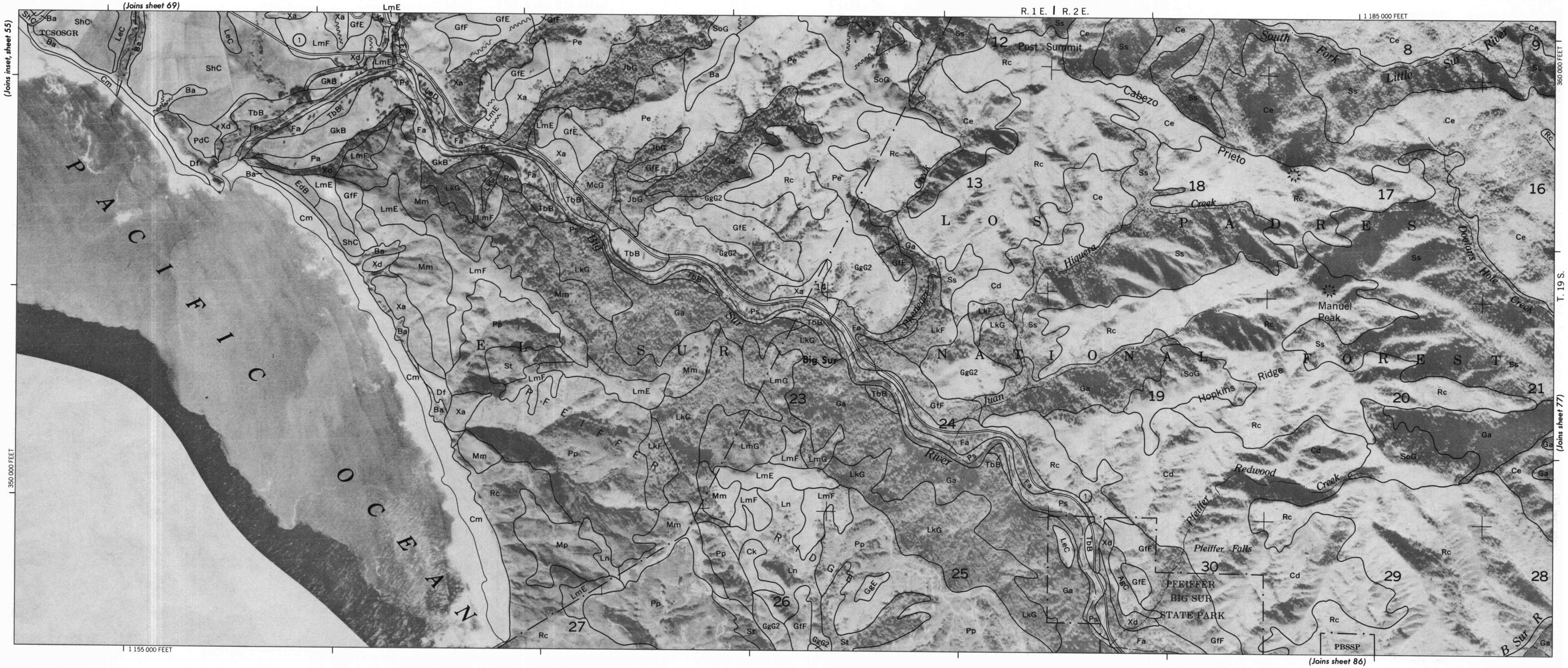
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

N

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 76



1 ¾ ½ ¼ 0 1 2 Miles

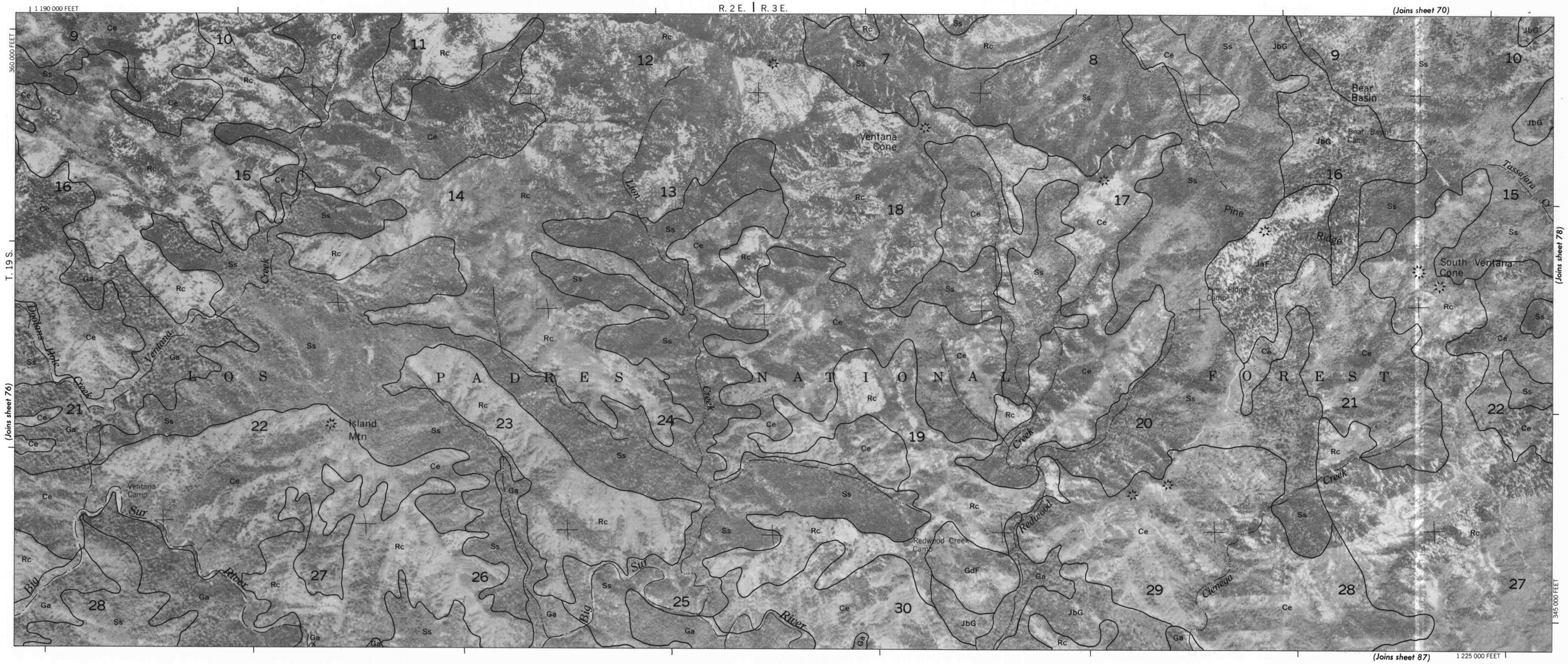
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

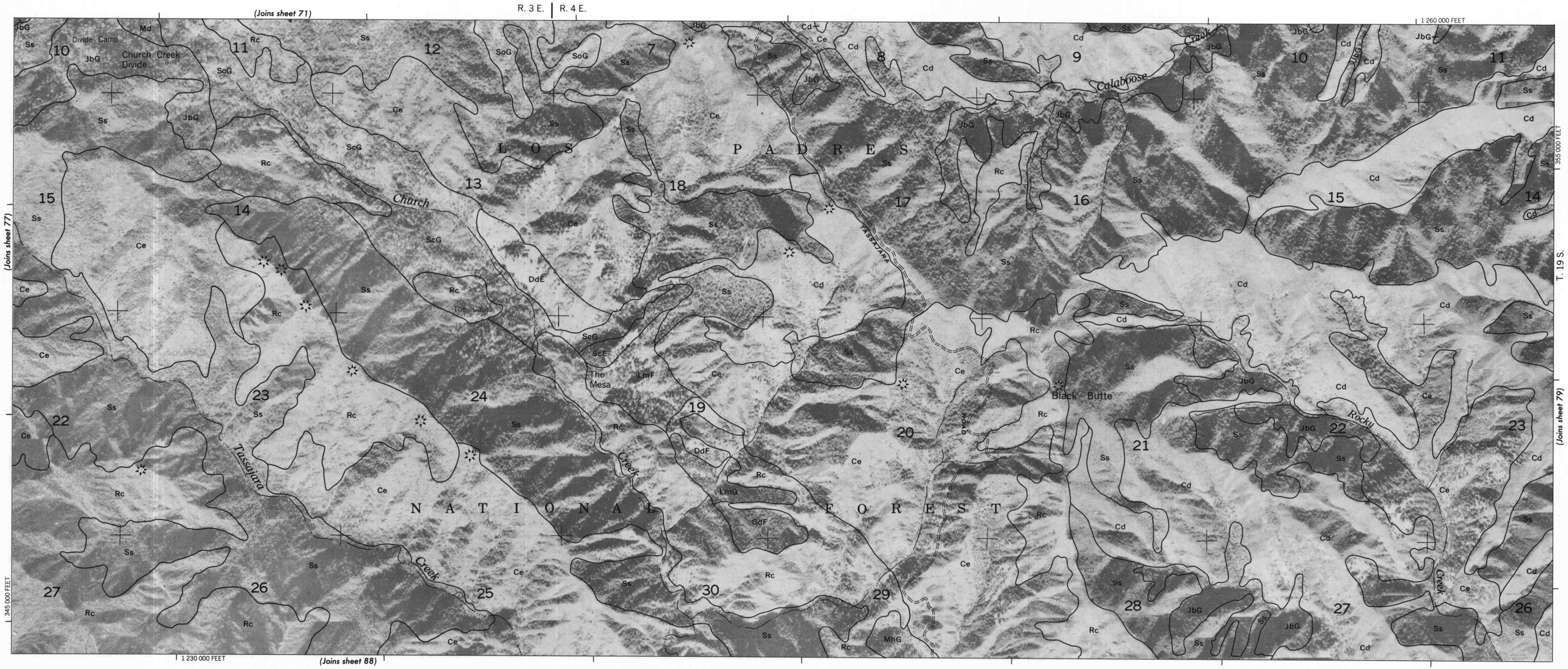
This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 ¾ ½ ¼ 0 1 2 Miles
5000 4000 3000 2000 1000 0 5000 10000 Feet
Scale 1:24000

N

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 78



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

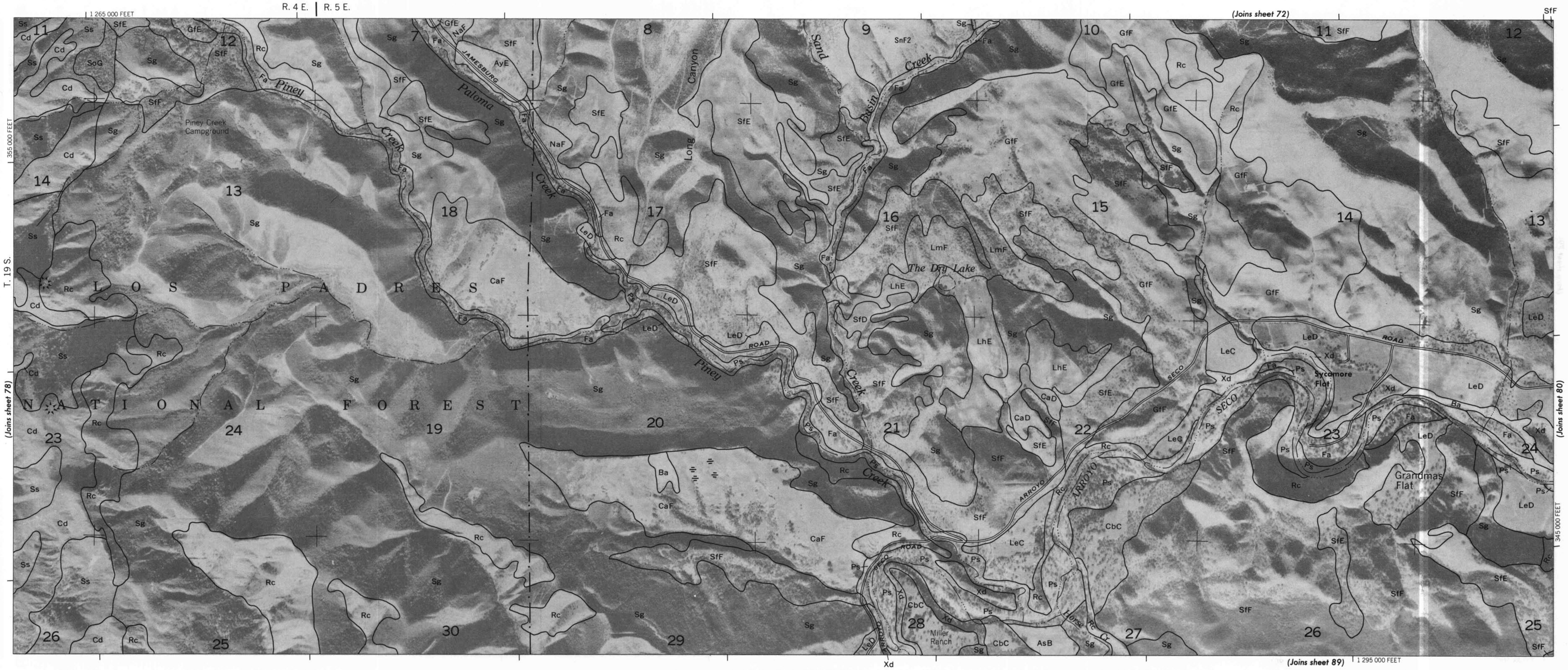
Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

MONTEREY COUNTY, CALIFORNIA NO. 79

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



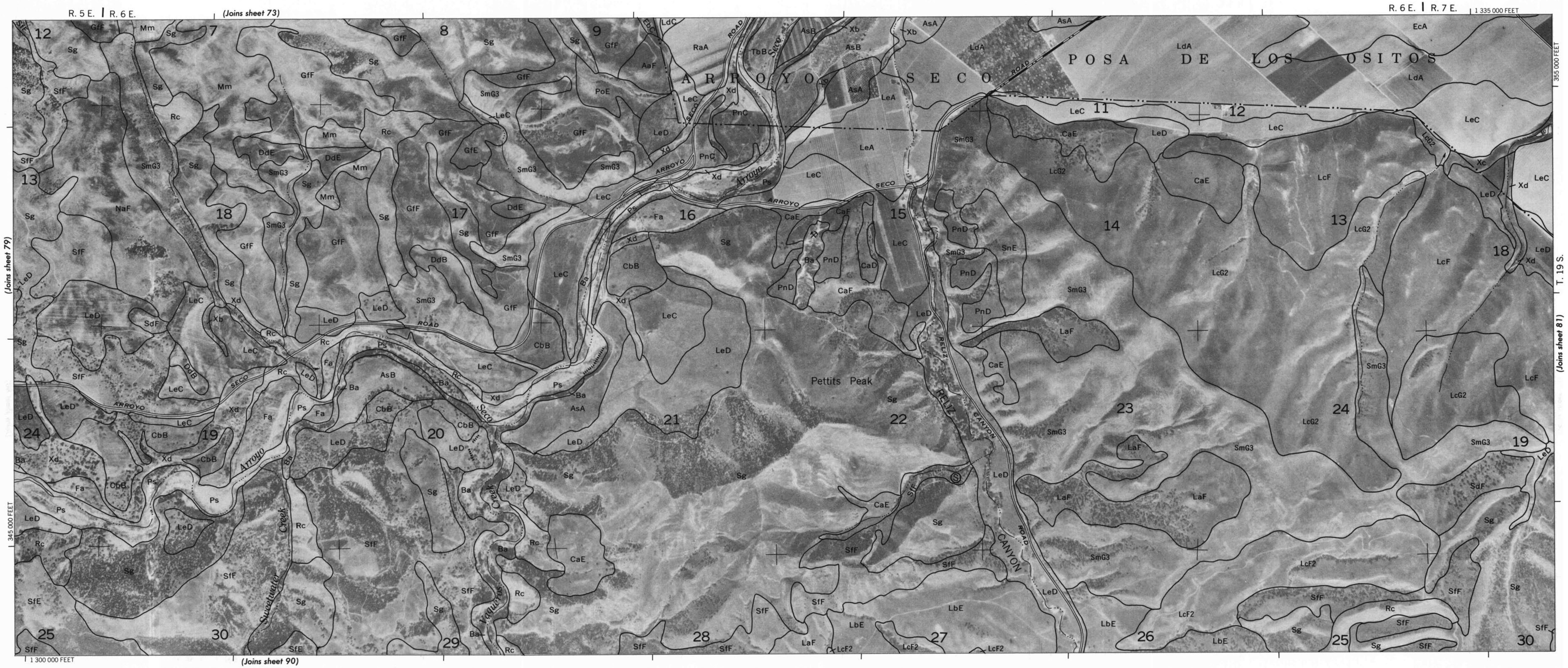
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

N

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 80



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

81
N

MONTEREY COUNTY, CALIFORNIA NO. 81

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles
5000 4000 3000 2000 1000 0 5000 10000 Feet
Scale 1:24000

N

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 82

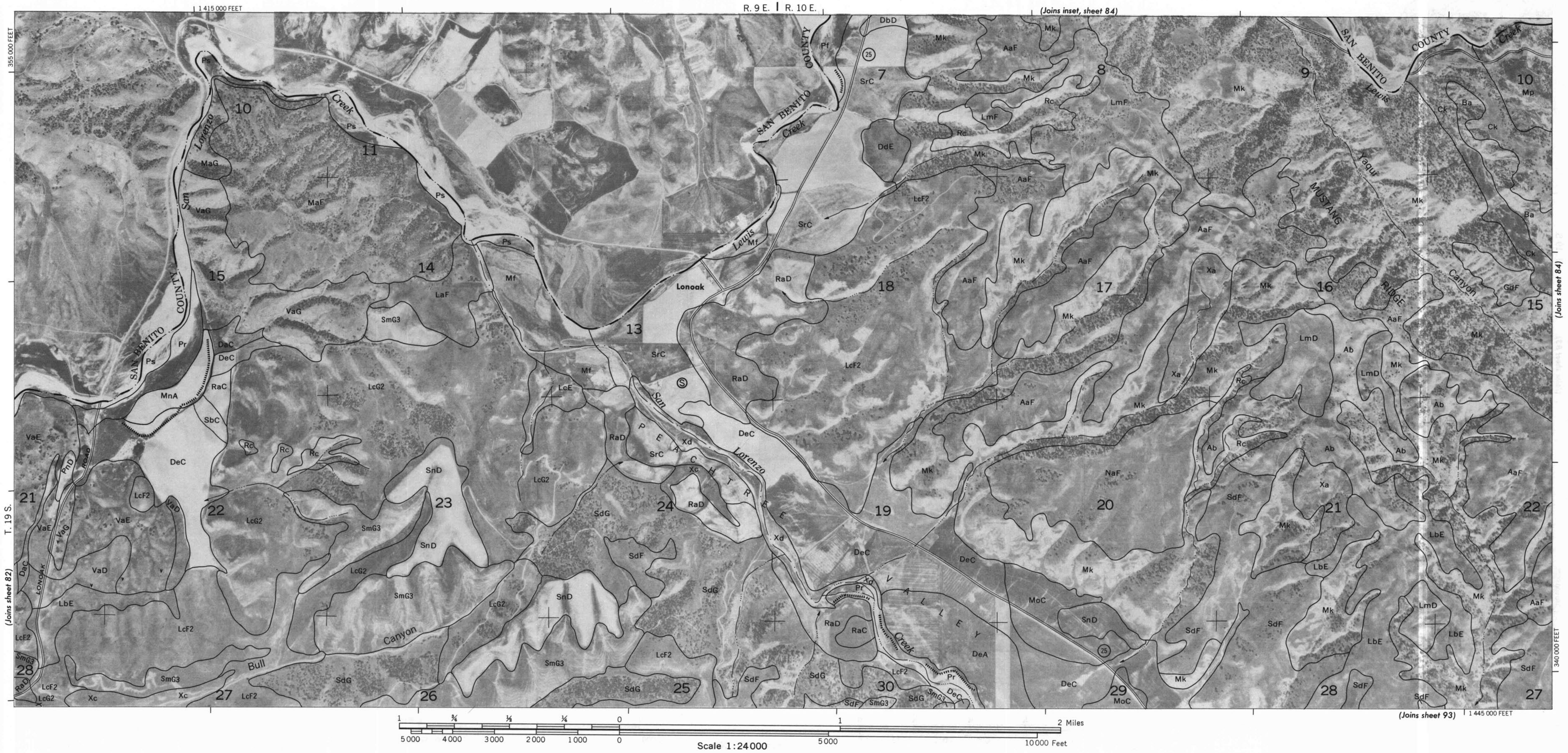
Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA NO. 82

83

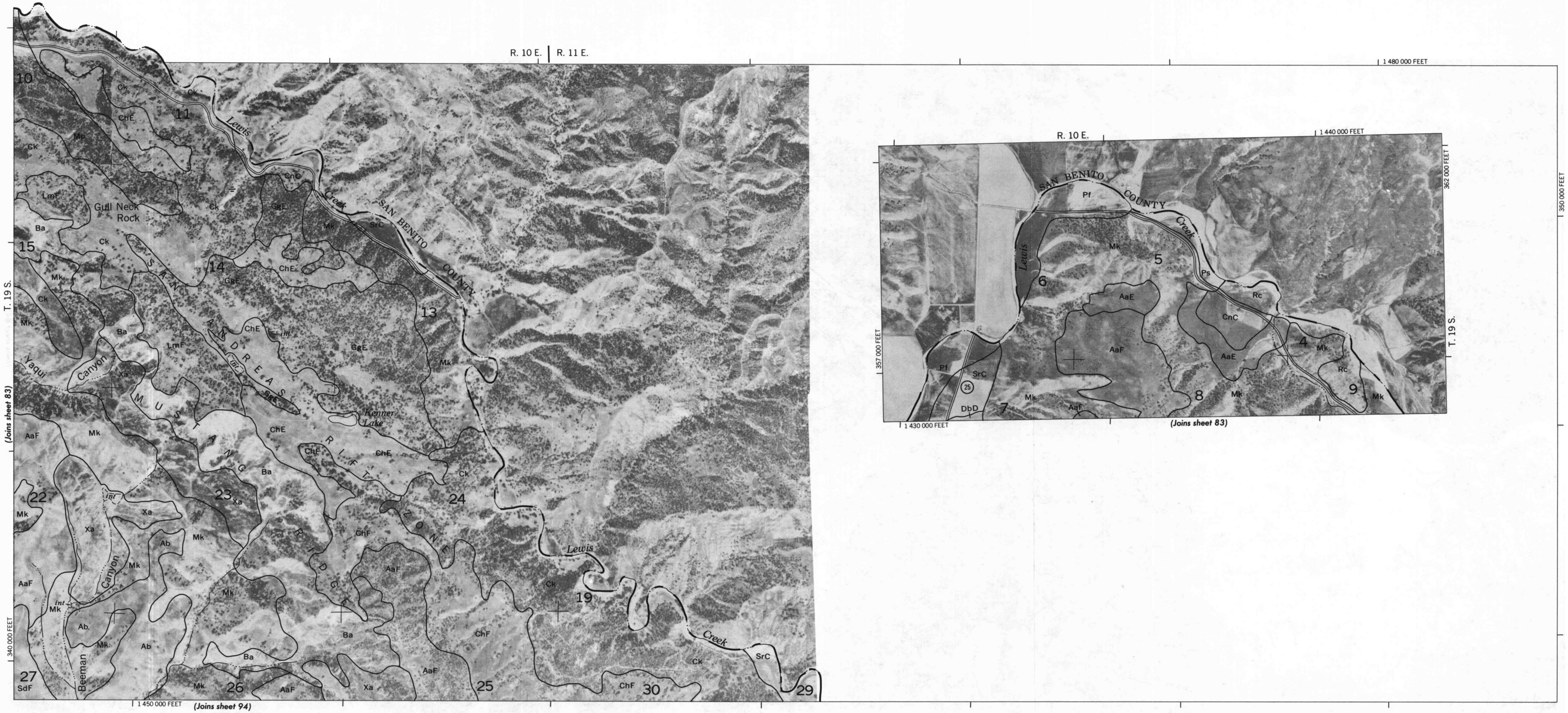
N



This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA NO. 83

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 84



1 ¾ ½ ¼ 0 1 2 Miles

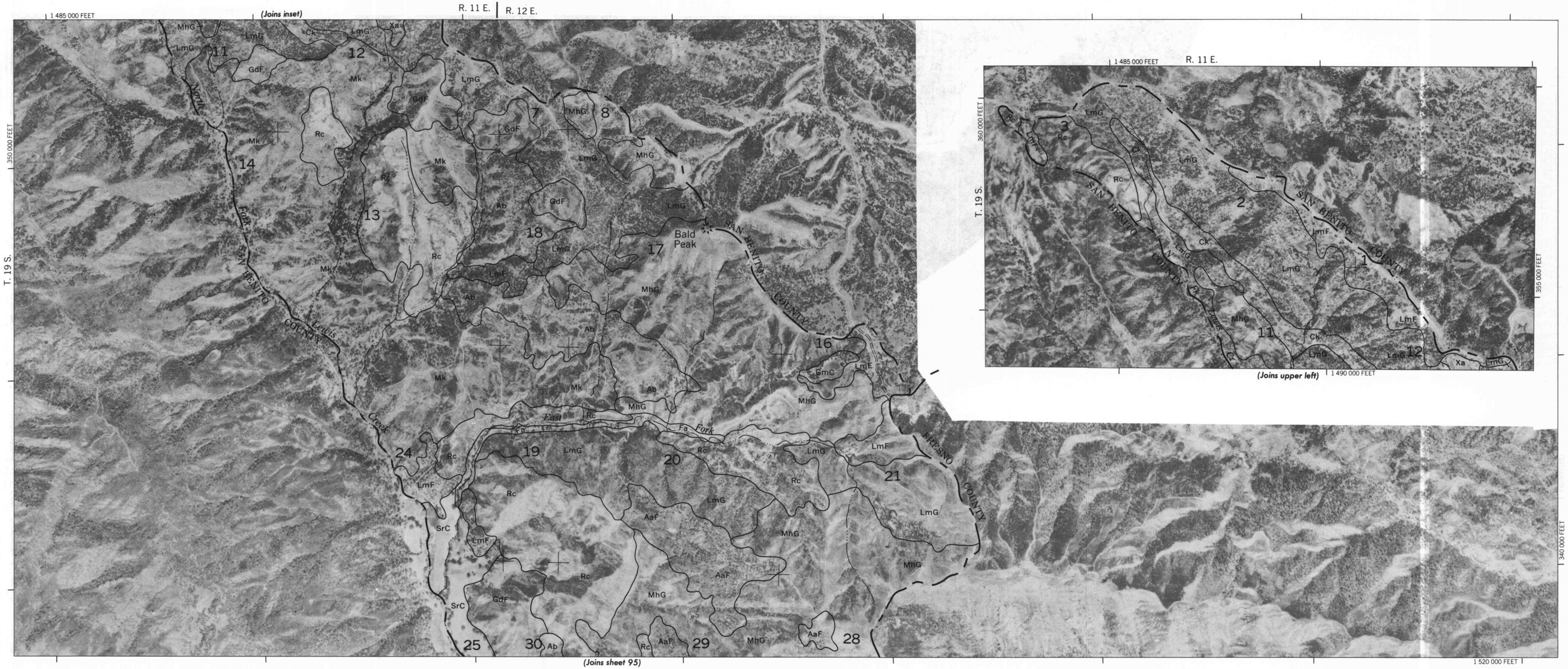
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



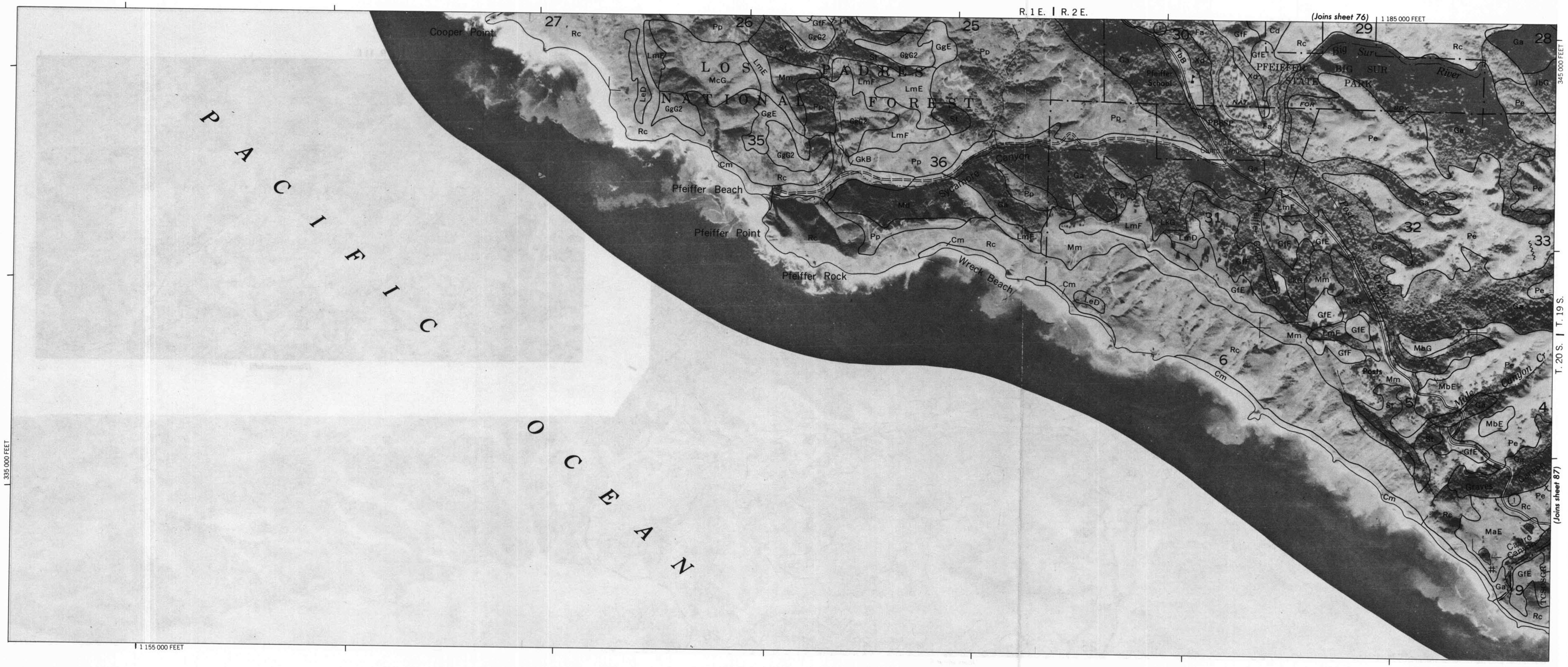
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

N

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 86



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

87

N

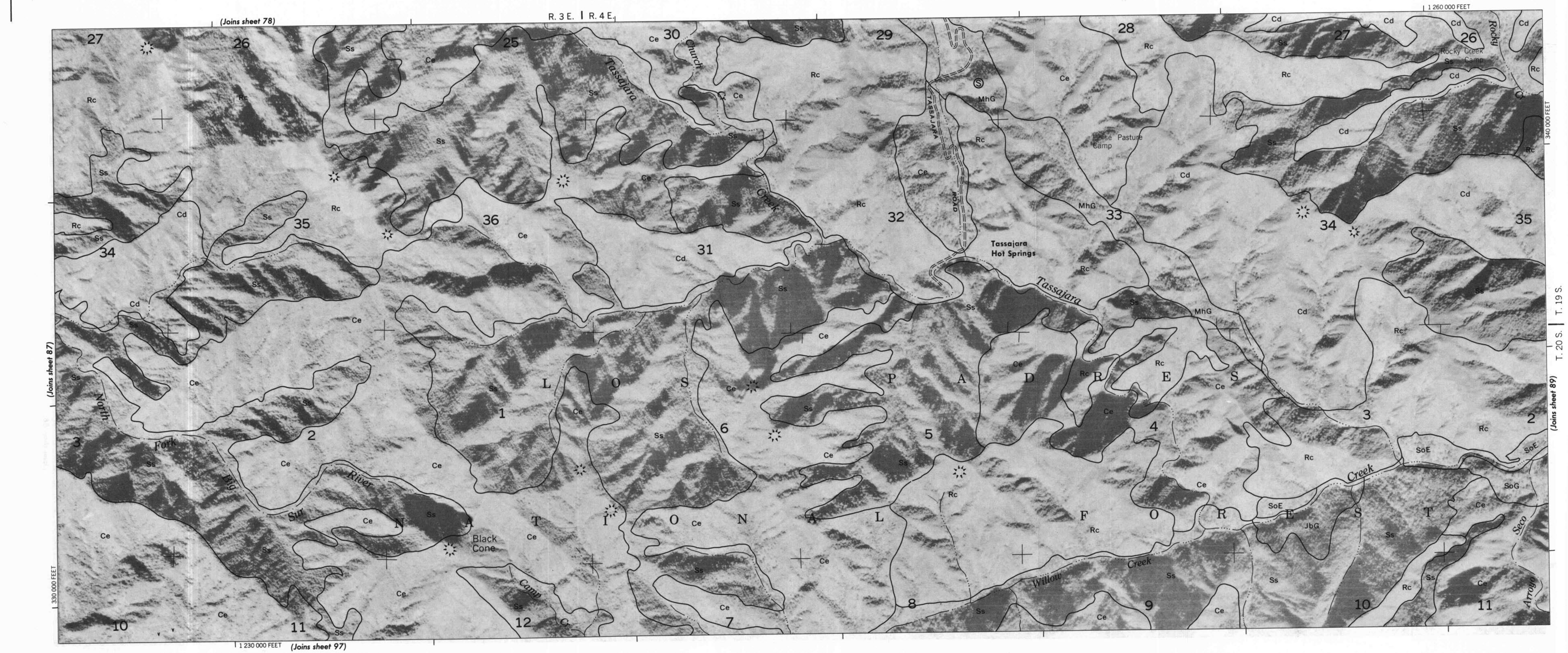
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 88



1 ¾ ½ ¼ 0 1 2 Miles

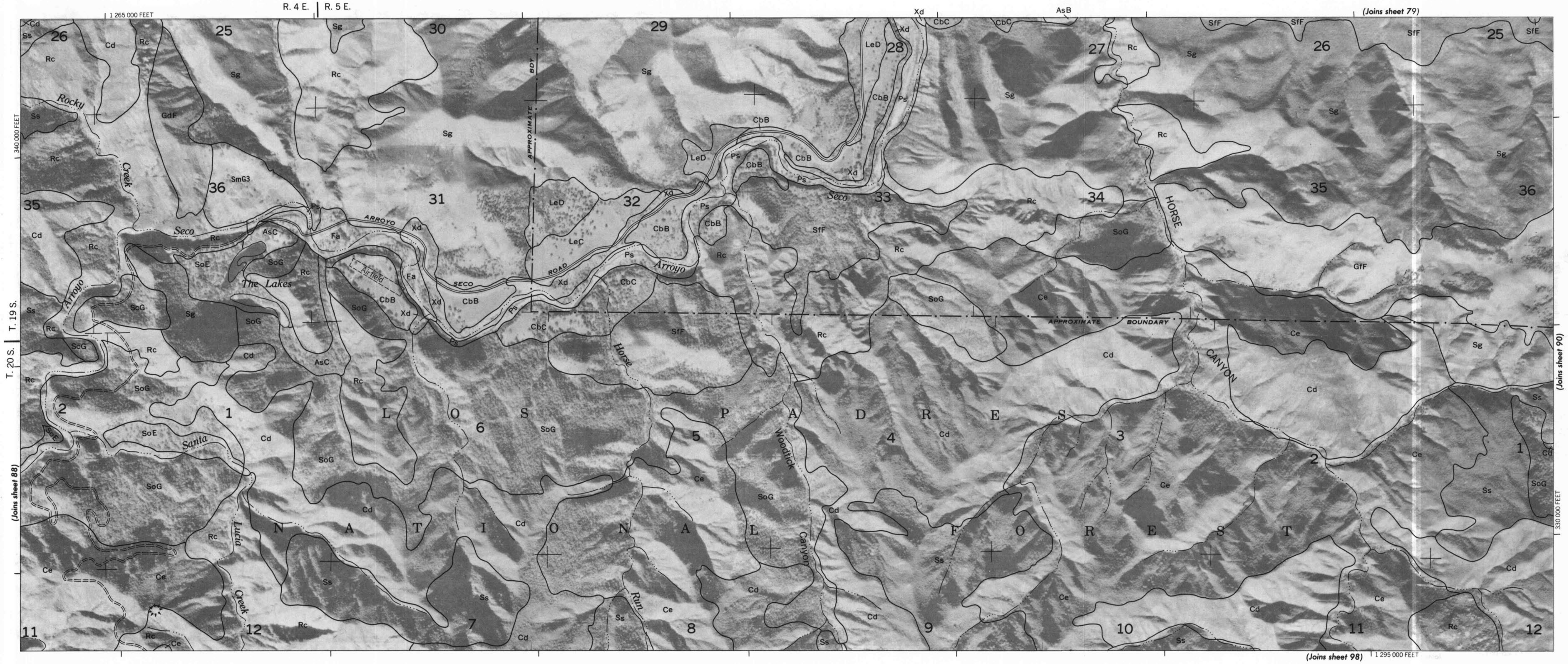
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

89

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

MONTEREY COUNTY, CALIFORNIA NO. 89

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA NO. 90

91

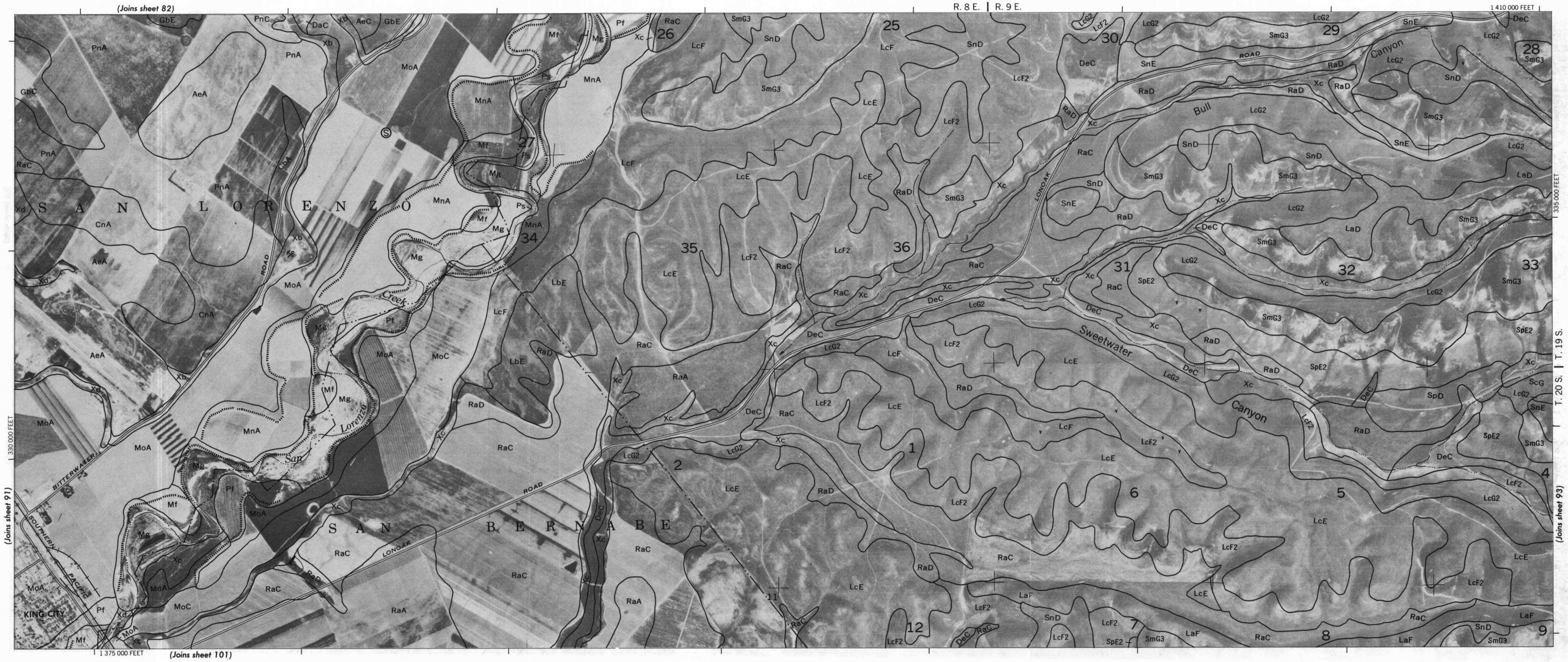
N

MONTEREY COUNTY, CALIFORNIA NO. 91

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles
5000 4000 3000 2000 1000 0 5000 10000 Feet
Scale 1:24000

N



Scale 1:24000

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

MONTEREY COUNTY, CALIFORNIA NO. 93

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA NO. 94

95

N

MONTEREY COUNTY, CALIFORNIA NO. 95

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

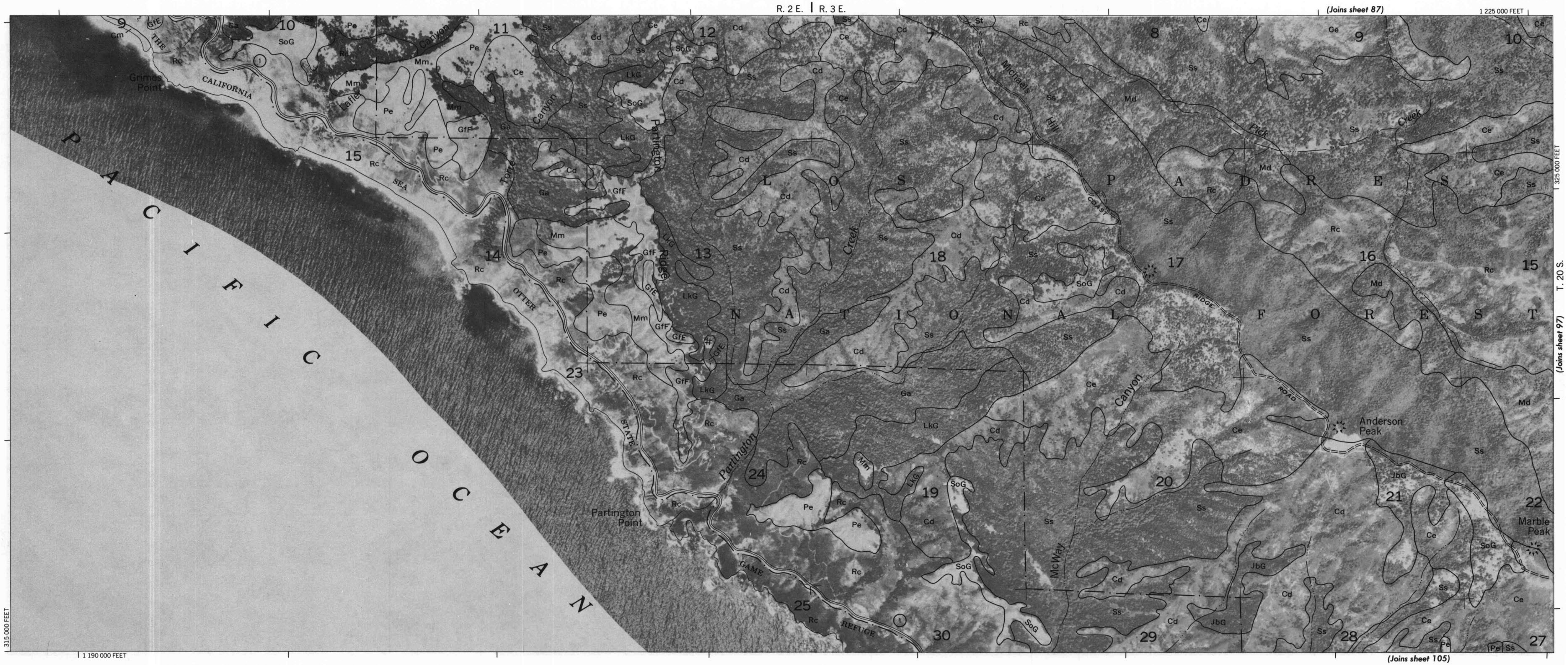
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

N

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 96



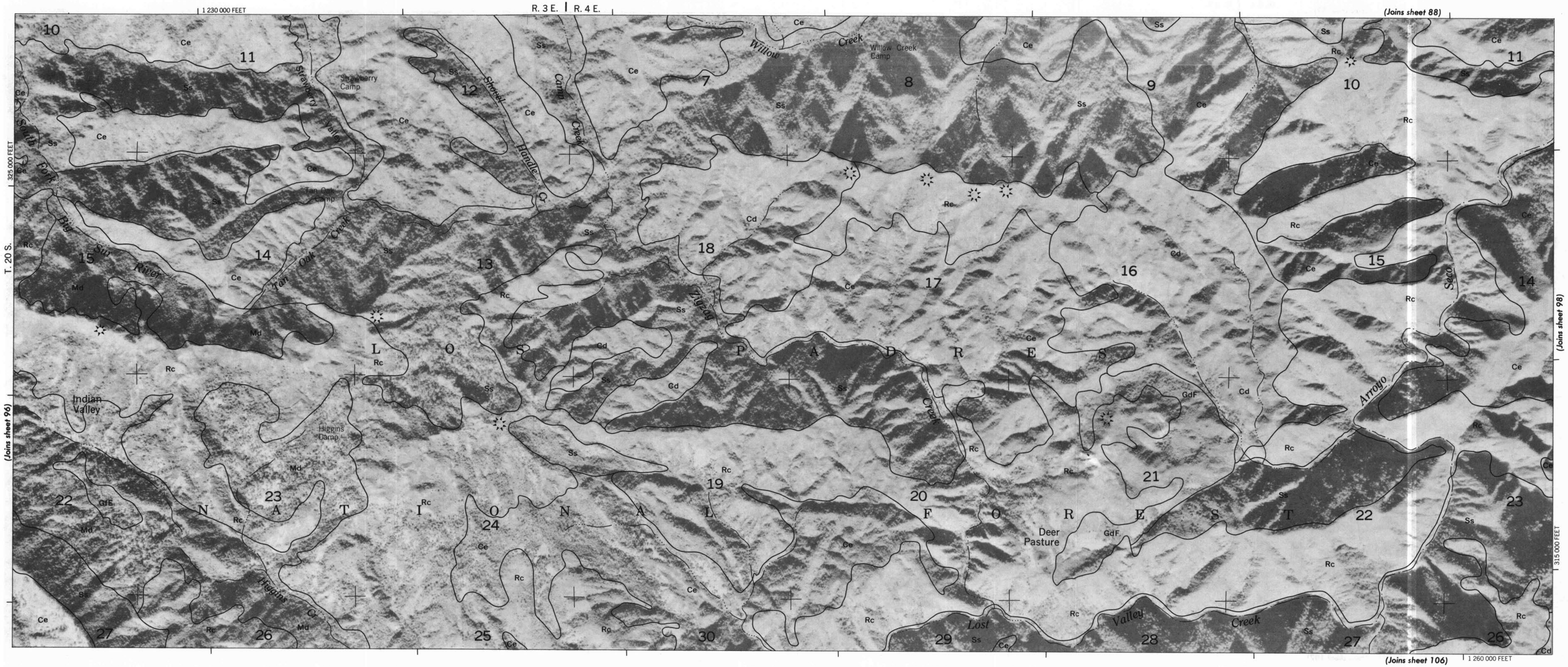
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N



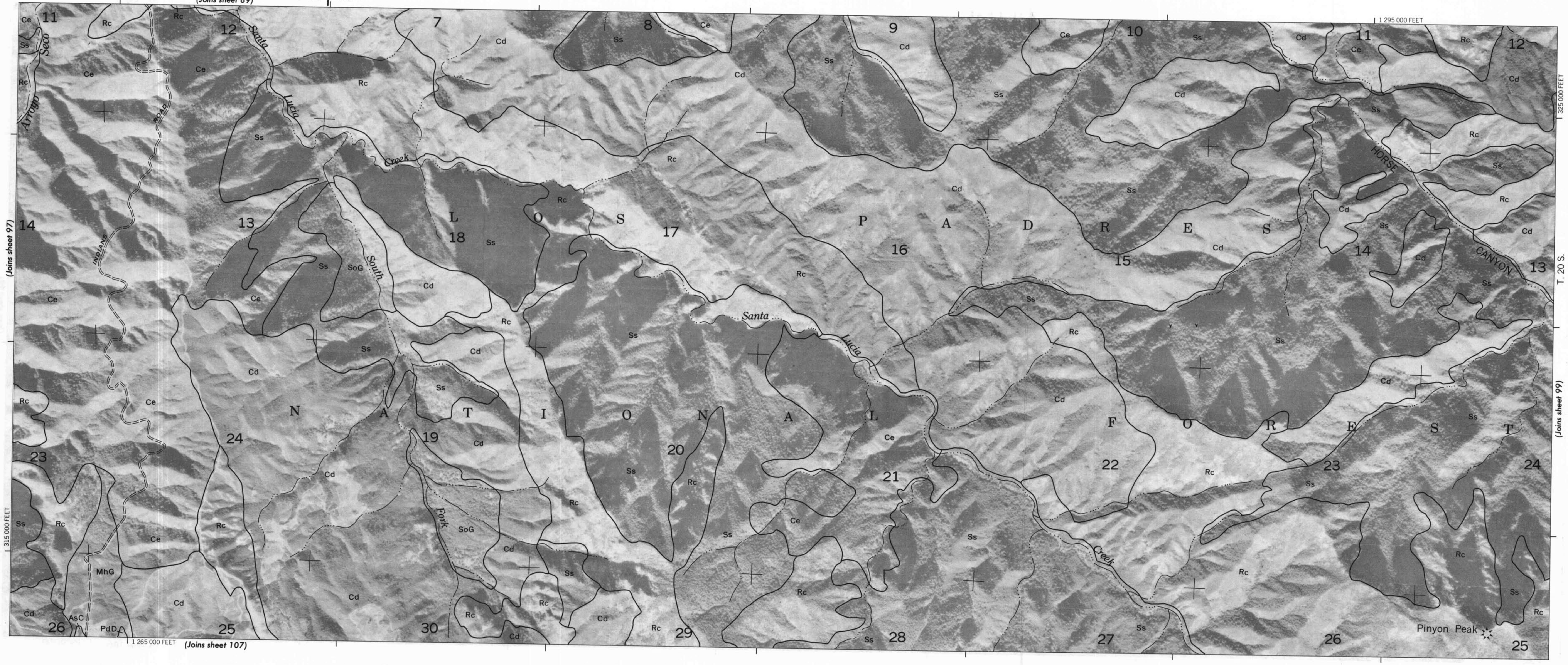
1 ¾ ½ ¼ 0 1 2 Miles
5000 4000 3000 2000 1000 0 5000 10000 Feet
Scale 1:24000

MONTEREY COUNTY, CALIFORNIA NO. 97

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 98



Scale 1:24000

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

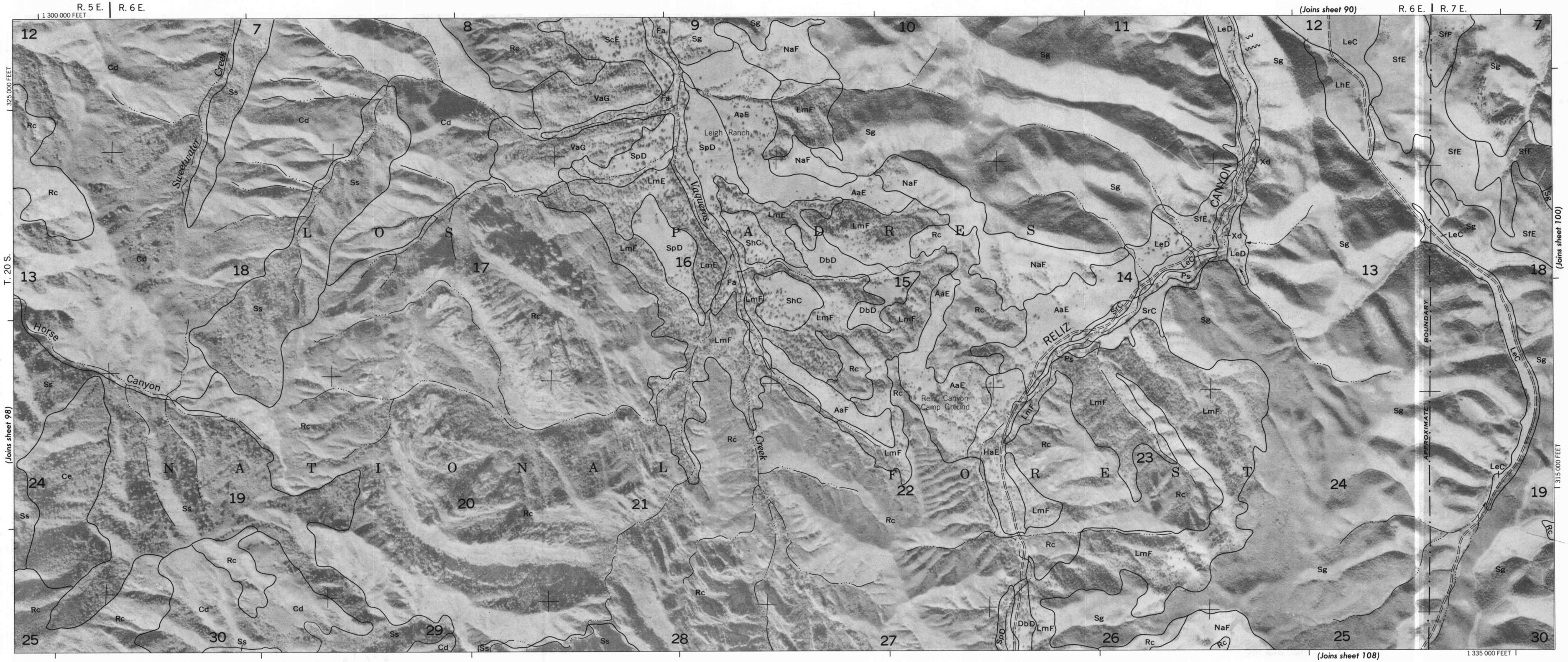
This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

99

N

MONTEREY COUNTY, CALIFORNIA NO. 99

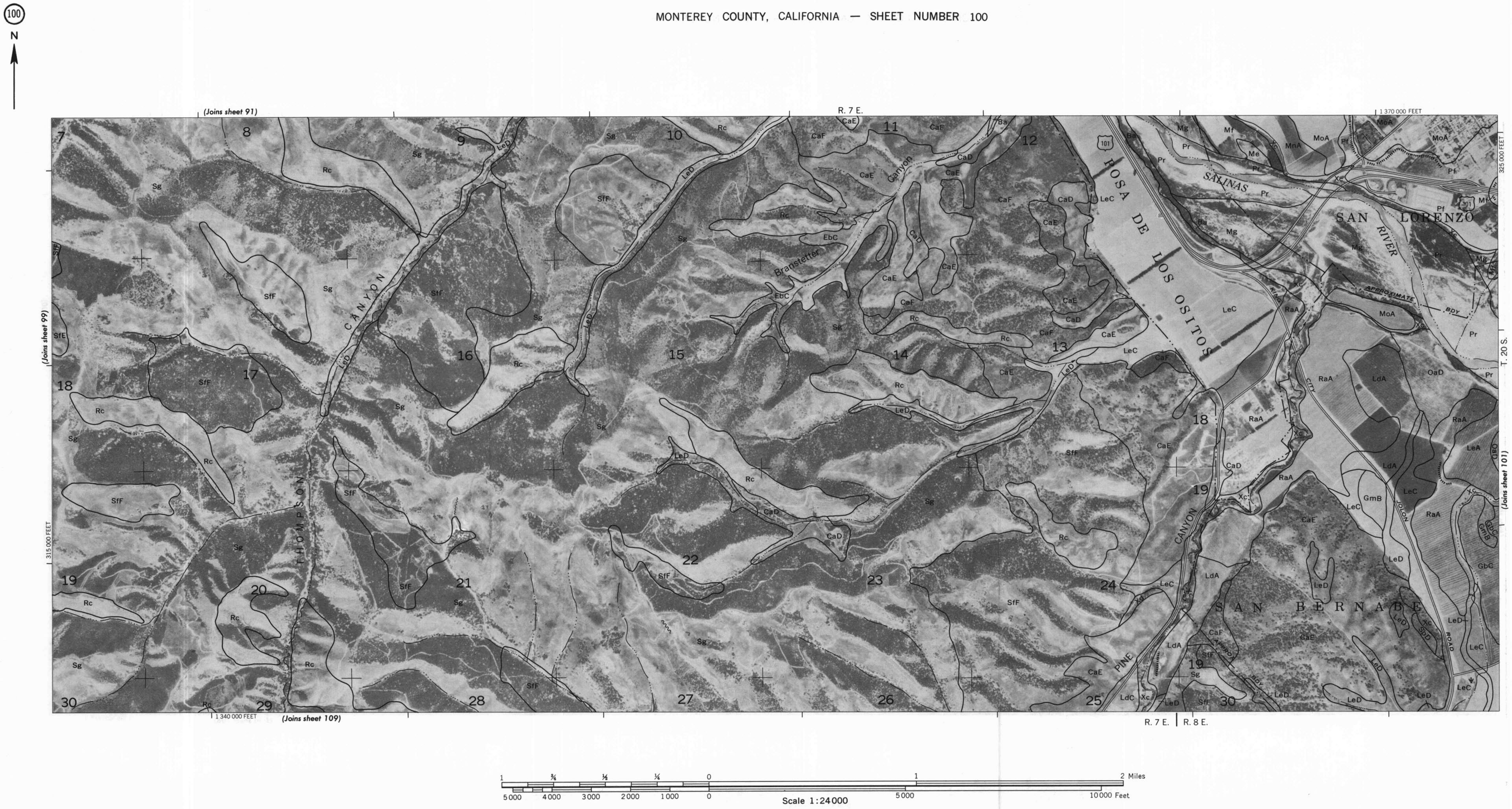
This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000



This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

101

N

MONTEREY COUNTY, CALIFORNIA NO. 101

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

N

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 102

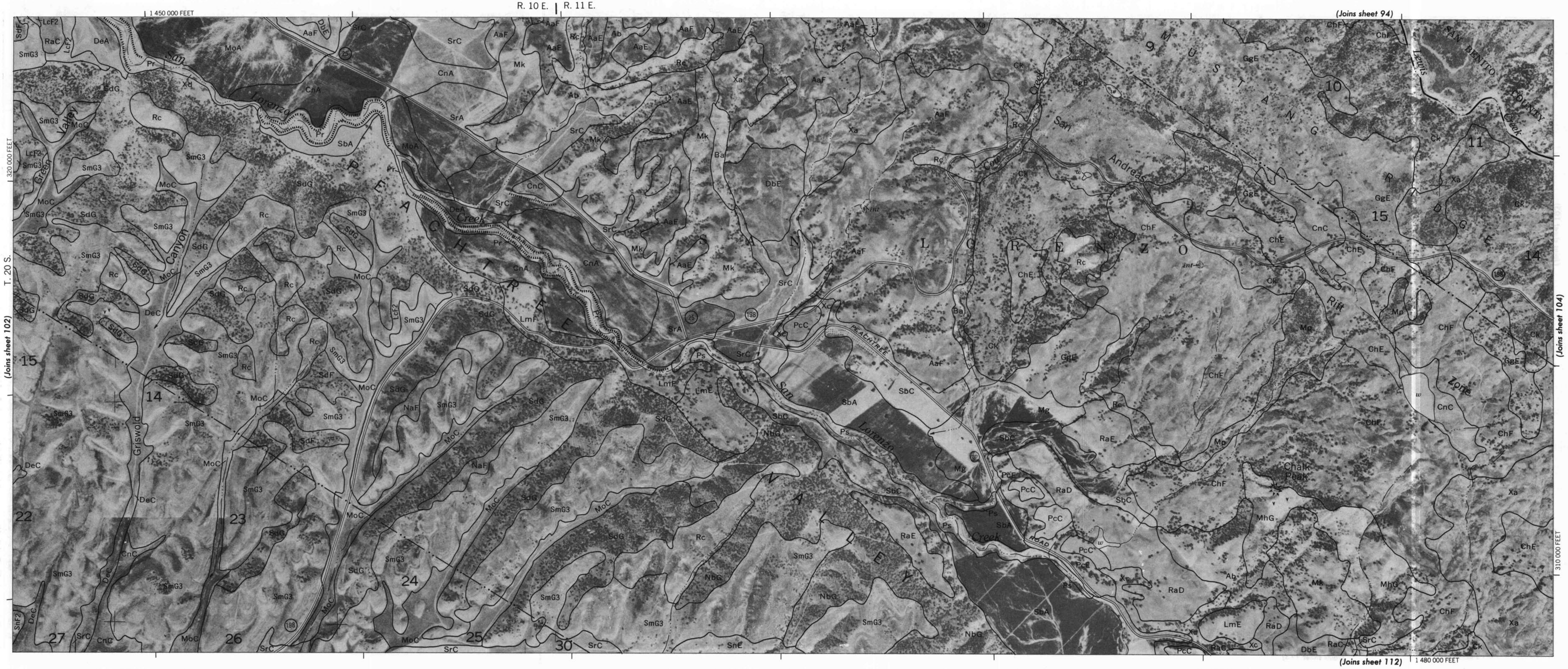
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

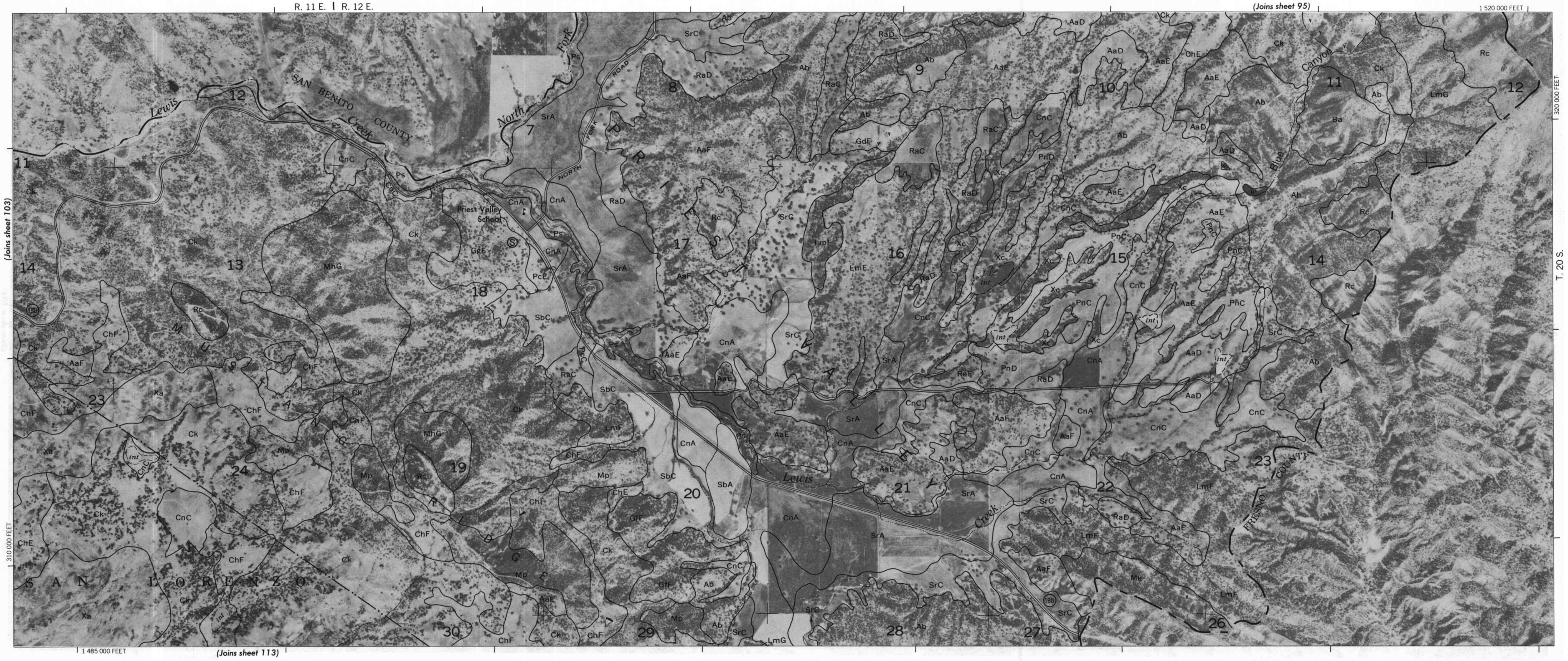
Scale 1:24000

MONTEREY COUNTY, CALIFORNIA NO. 103

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 104

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

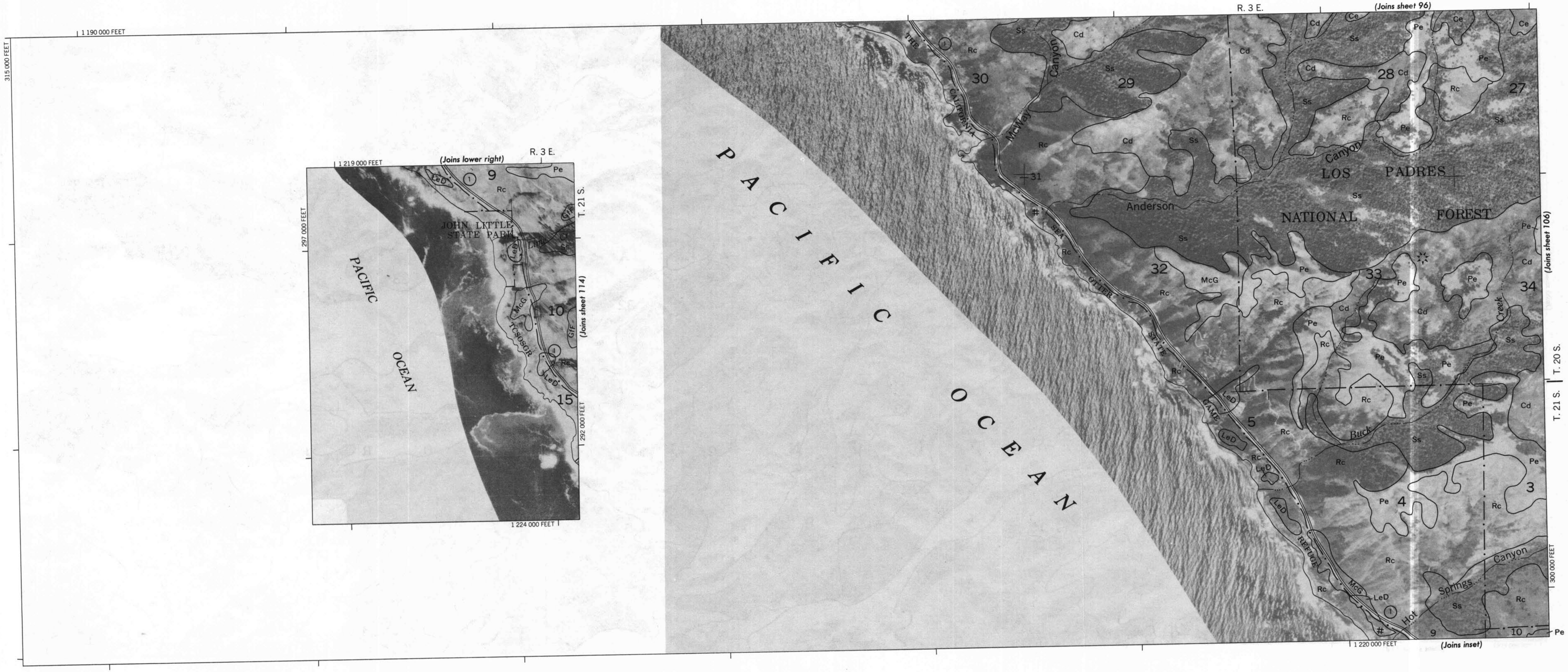
This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

105

N

MONTEREY COUNTY, CALIFORNIA NO. 105

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



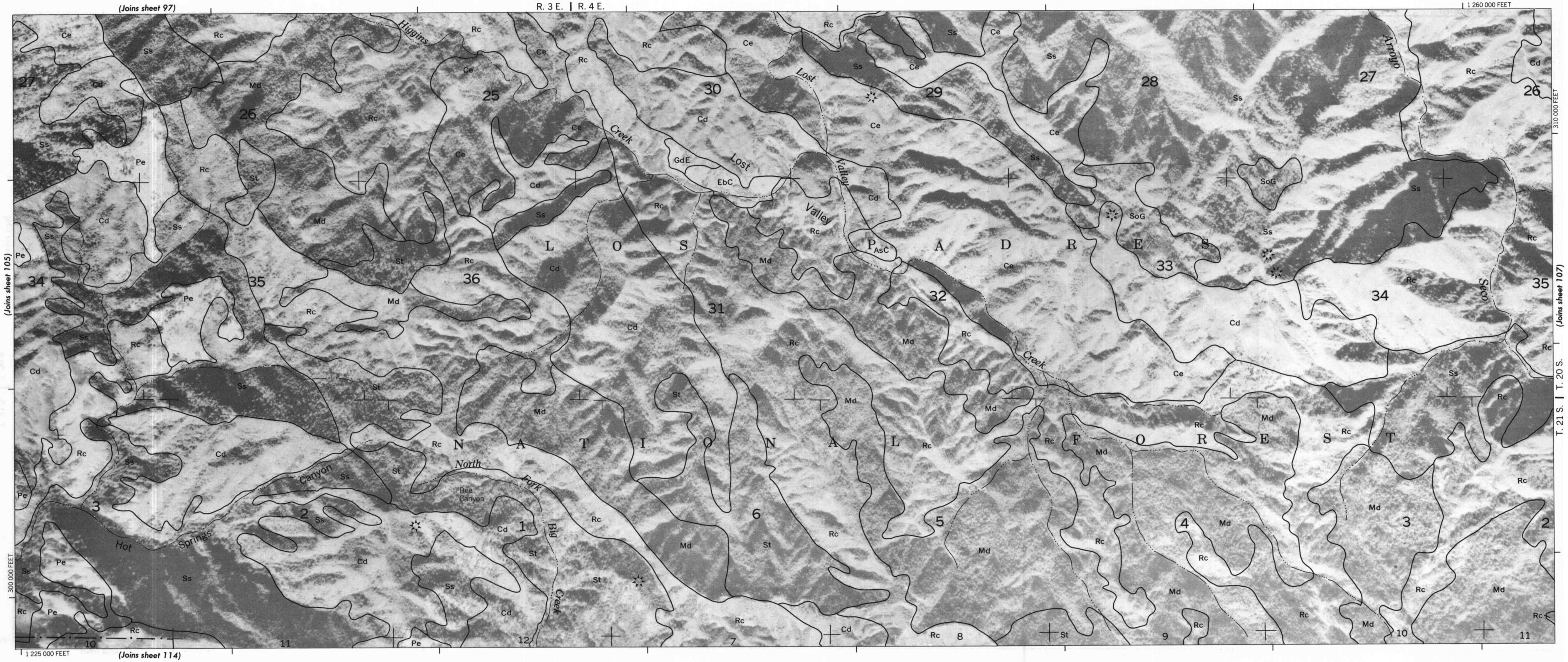
1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 10 000 Feet

Scale 1:24 000

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 106

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

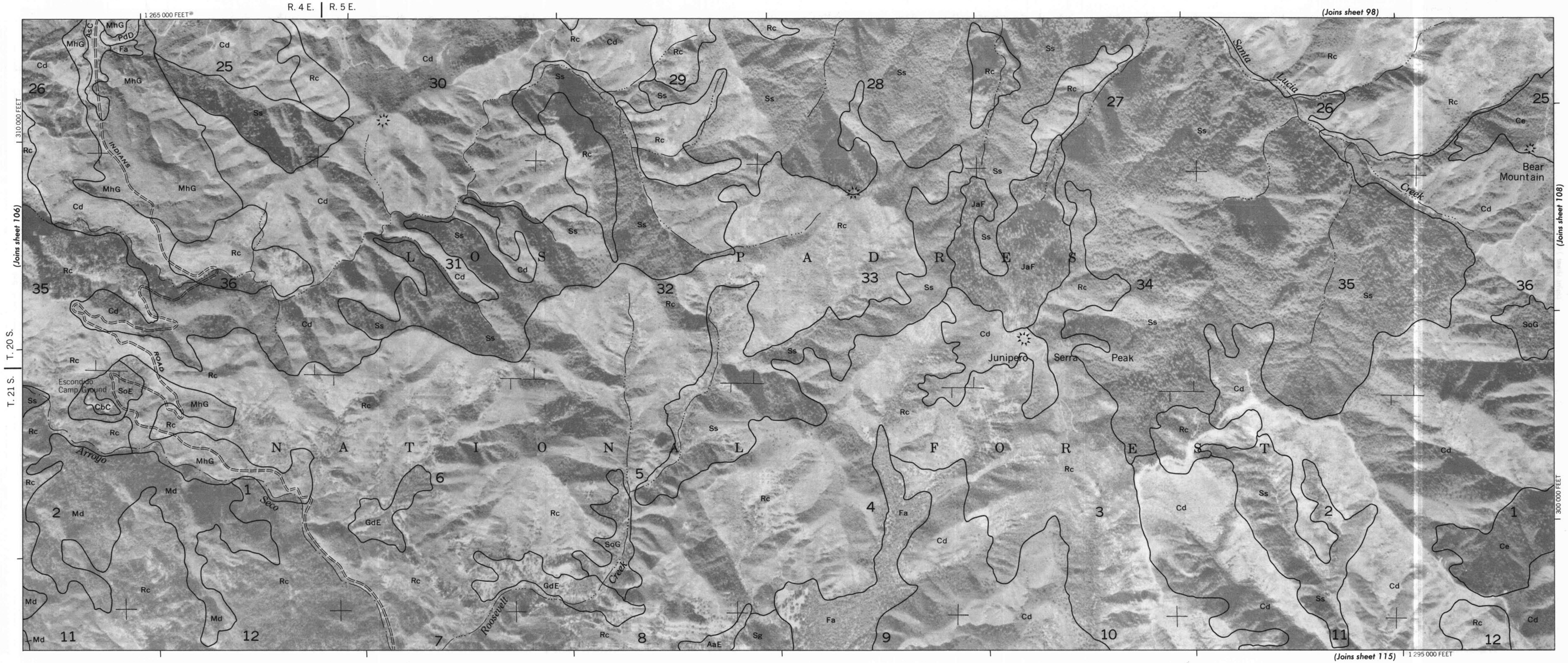
Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned

107

N

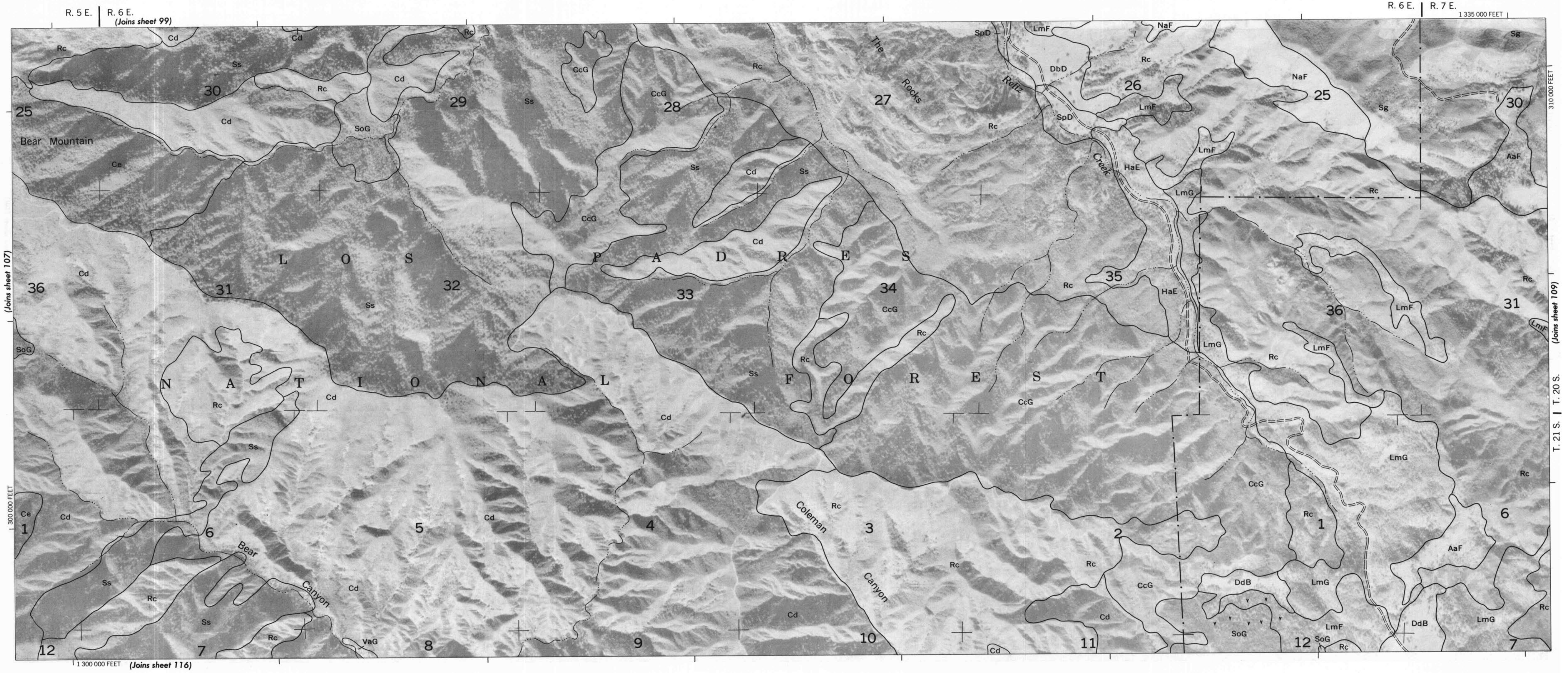
This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

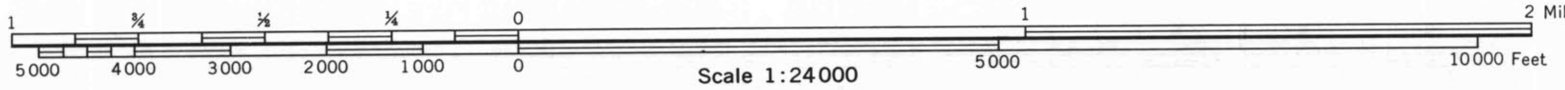


1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000





This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

MONTEREY COUNTY, CALIFORNIA NO. 109

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 340 000 FEET

R. 7 E. | R. 8 E.

(Joins sheet 100)

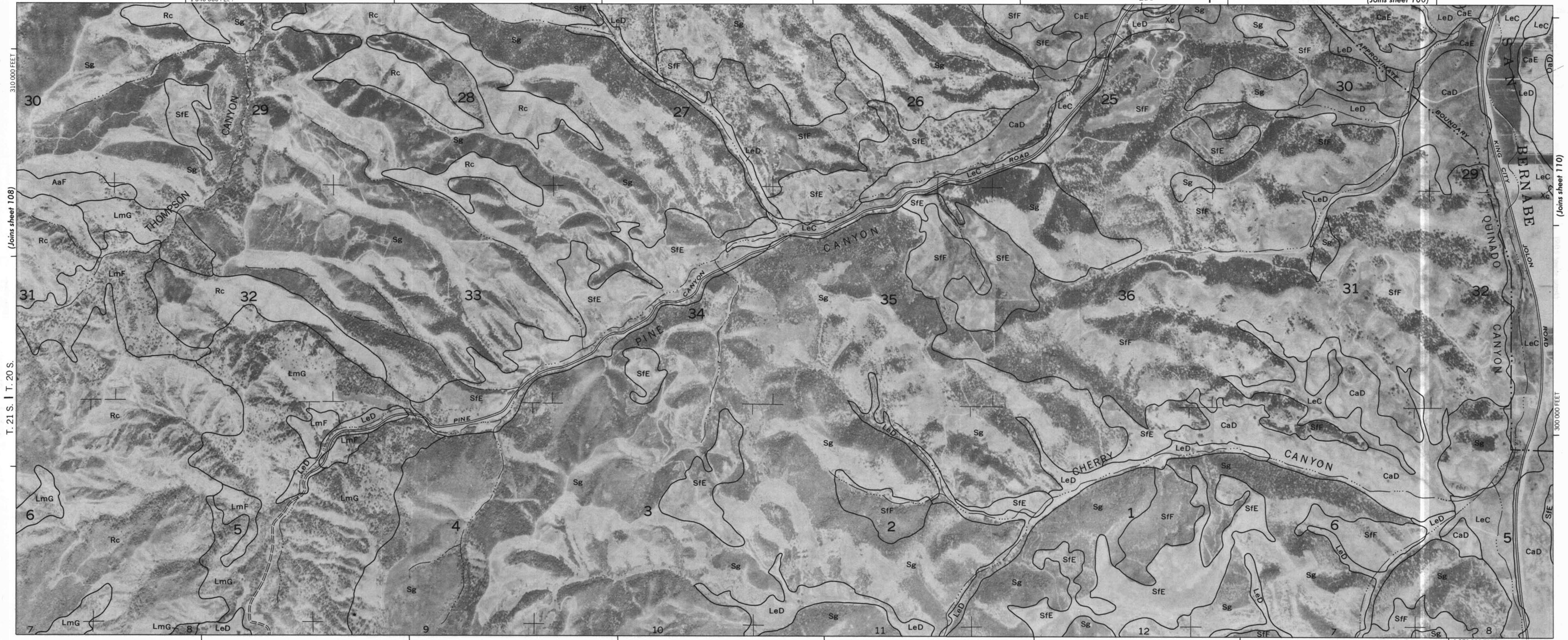
310 000 FEET

(Joins sheet 108)

T. 21 S. | T. 20 S.

(Joins sheet 110)

300 000 FEET



(Joins sheet 117)

1 370 000 FEET

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 110

N

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

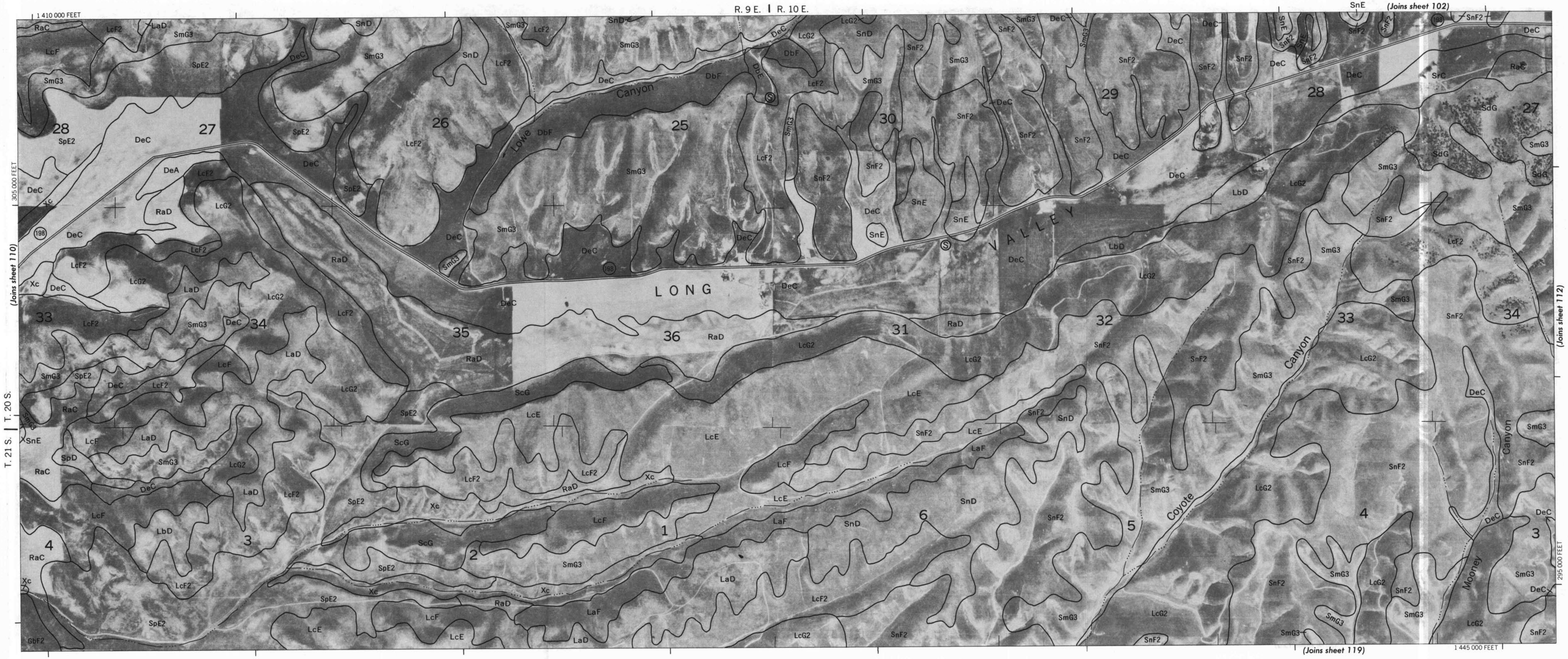
Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA NO. 110

111

N



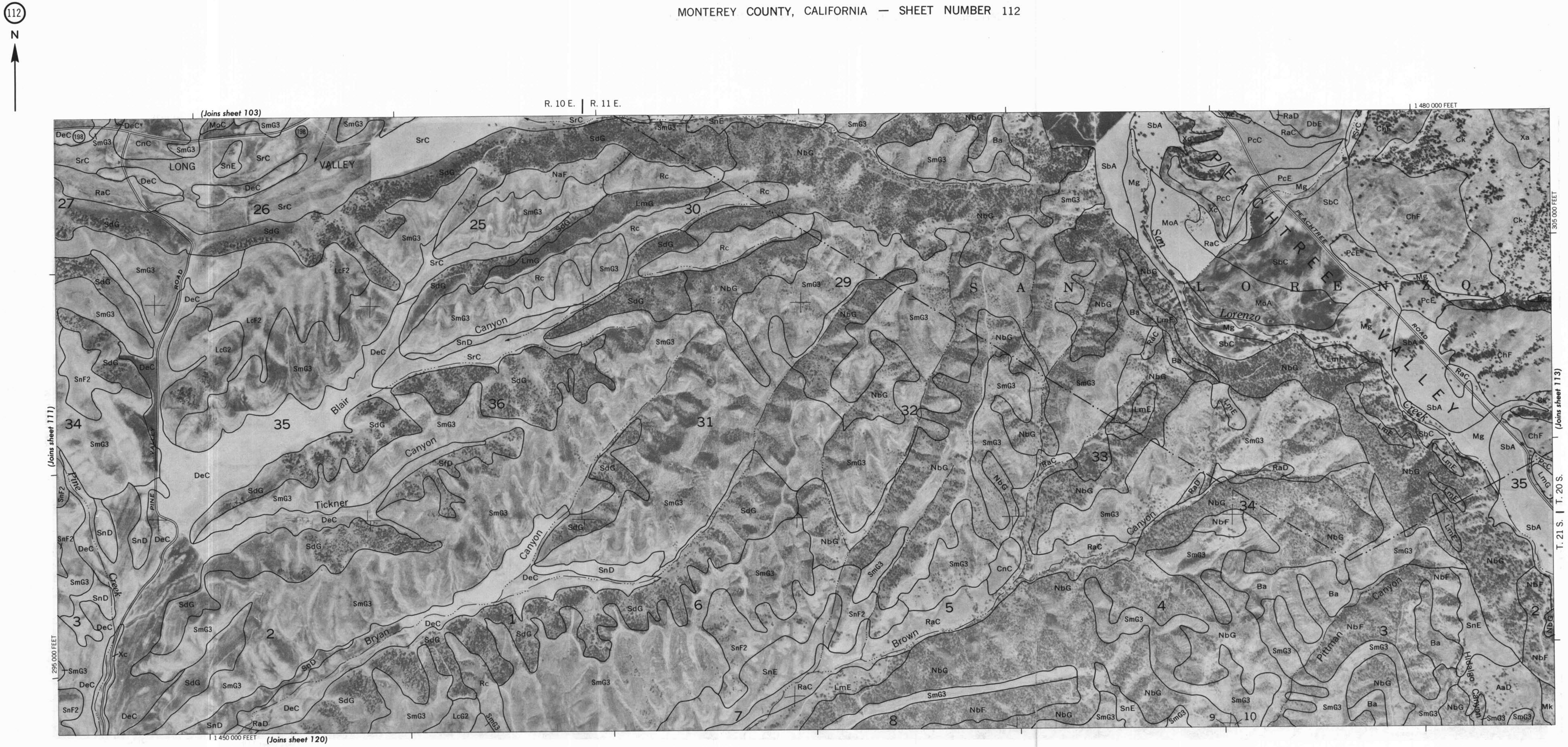
Scale 1:24 000

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

MONTEREY COUNTY, CALIFORNIA NO. 111

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

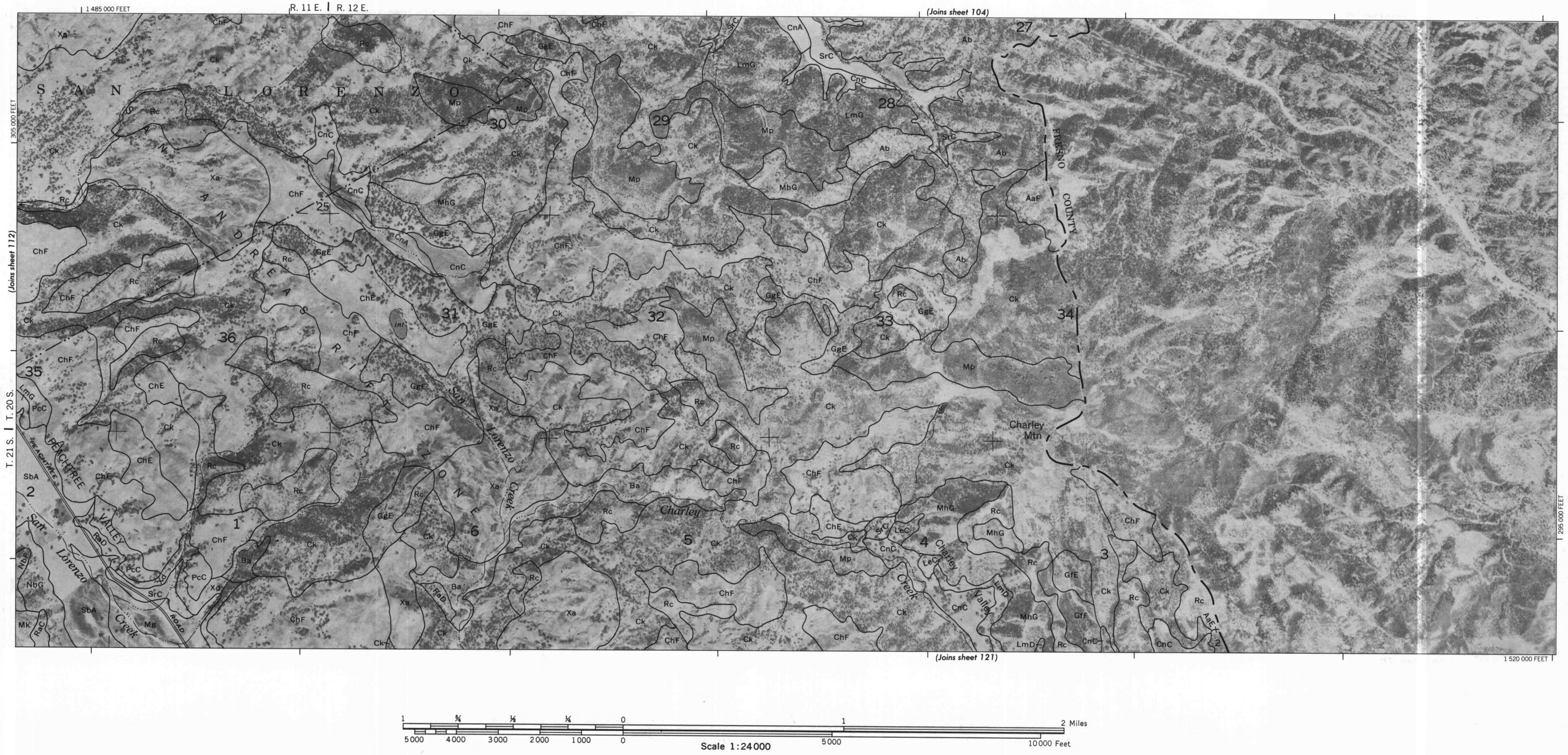
This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

113

N

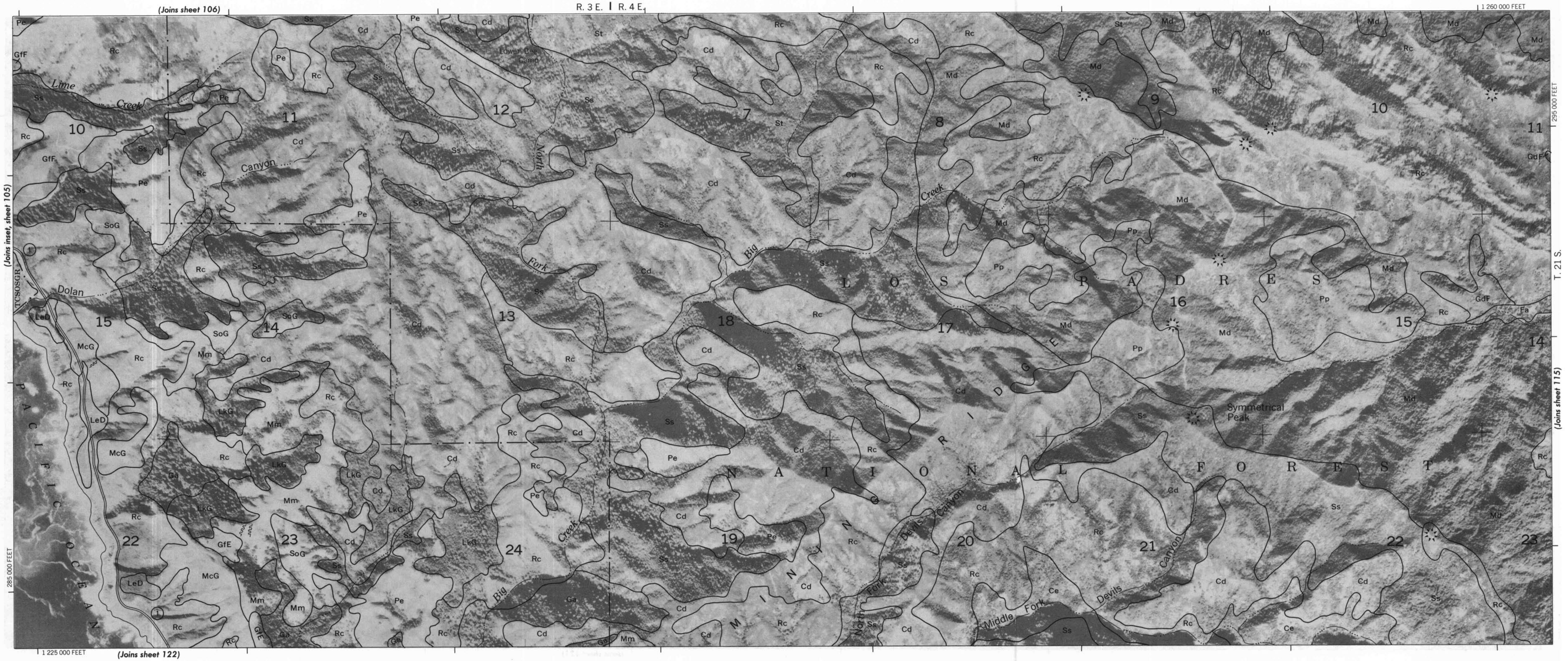
MONTEREY COUNTY, CALIFORNIA NO. 113

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



N

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 114



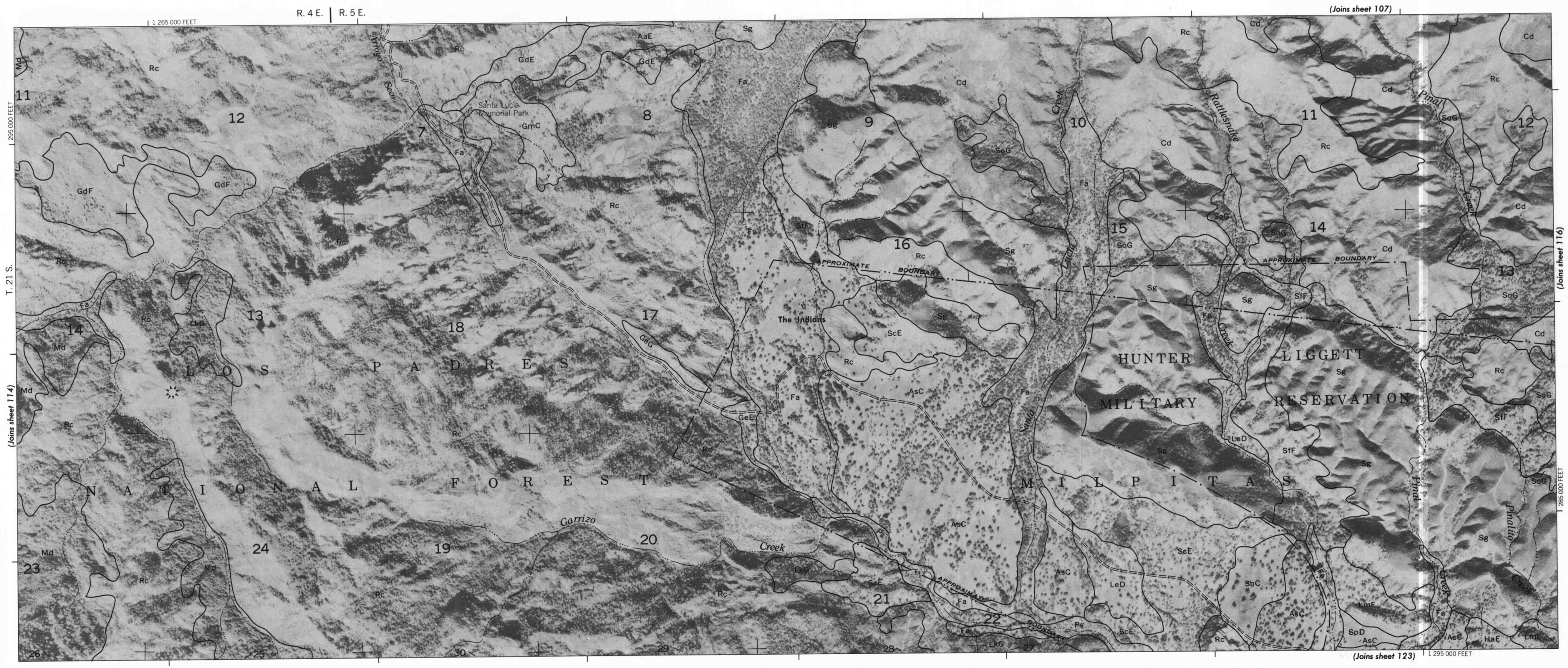
Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA NO. 114

115

N



1 ¾ ½ ¼ 0 1 2 Miles

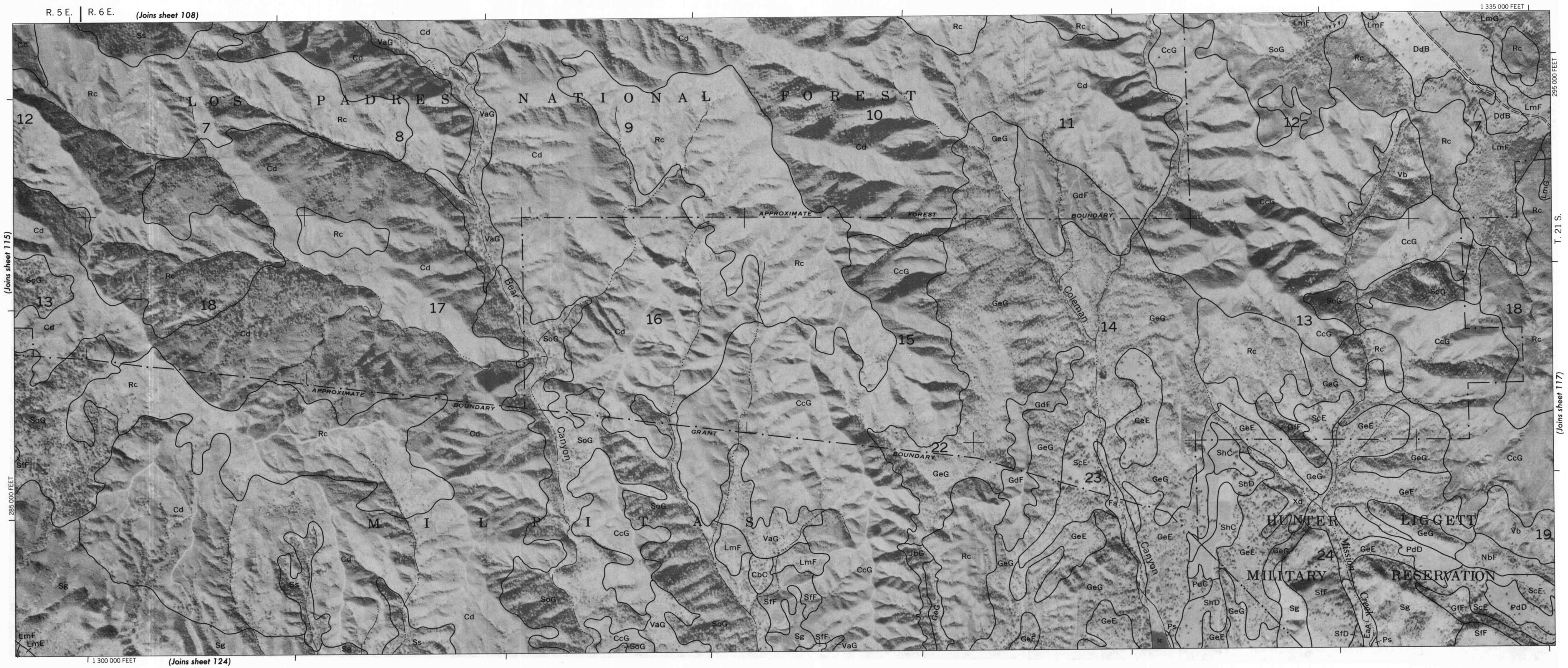
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

MONTEREY COUNTY, CALIFORNIA NO. 115

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N



1 ¾ ½ ¼ 0 1 2 Miles

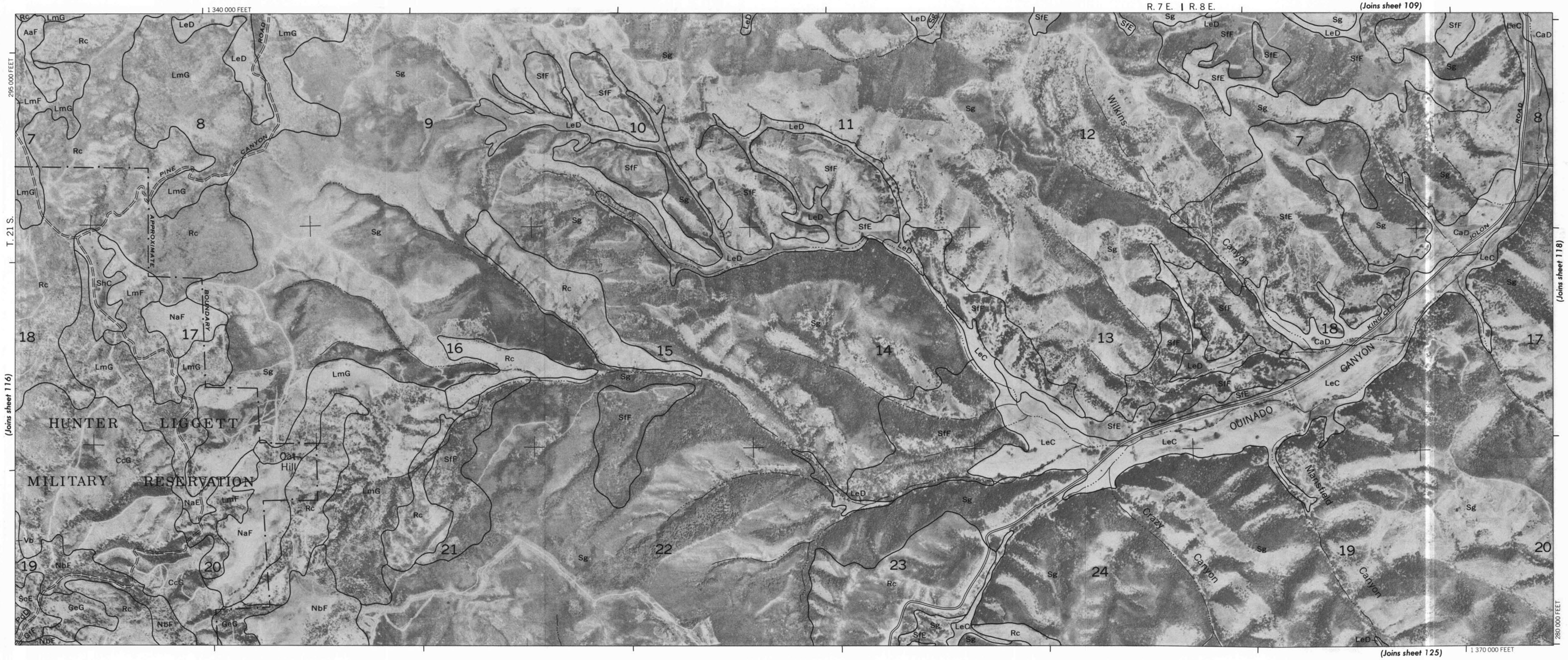
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

117

N



MONTEREY COUNTY, CALIFORNIA NO. 117

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

N

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

119

N

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA NO. 119

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

N

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 120

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

121

N

MONTEREY COUNTY, CALIFORNIA NO. 121

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

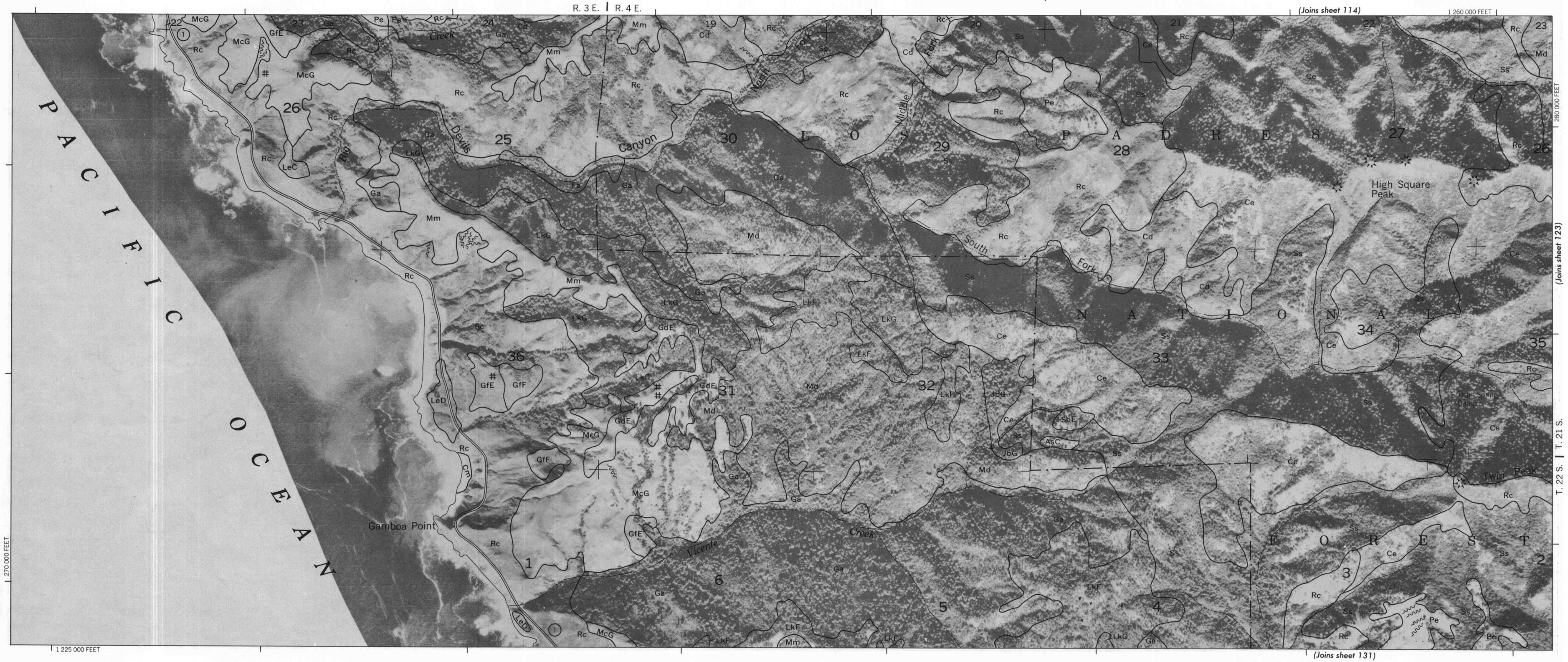
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

N

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 122



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

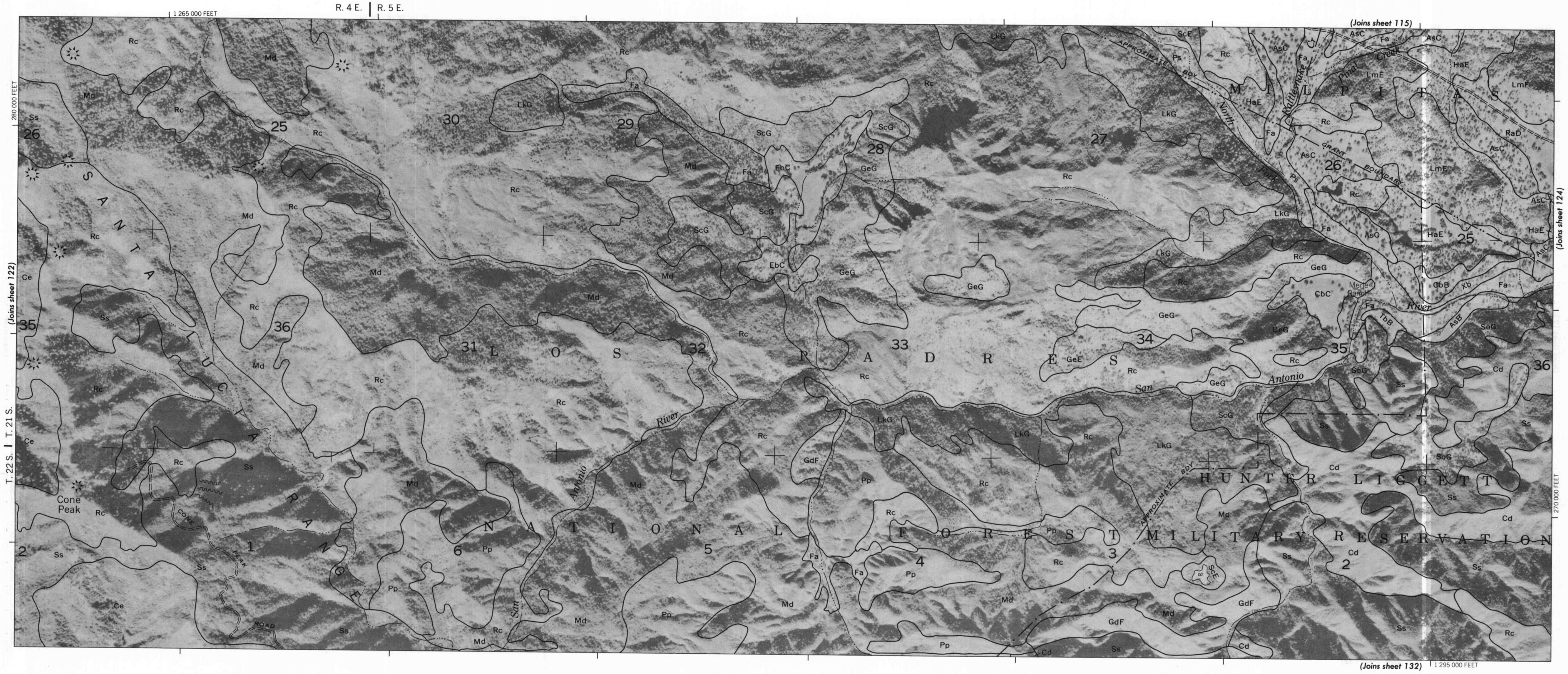
This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

123

N

MONTEREY COUNTY, CALIFORNIA NO. 123

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



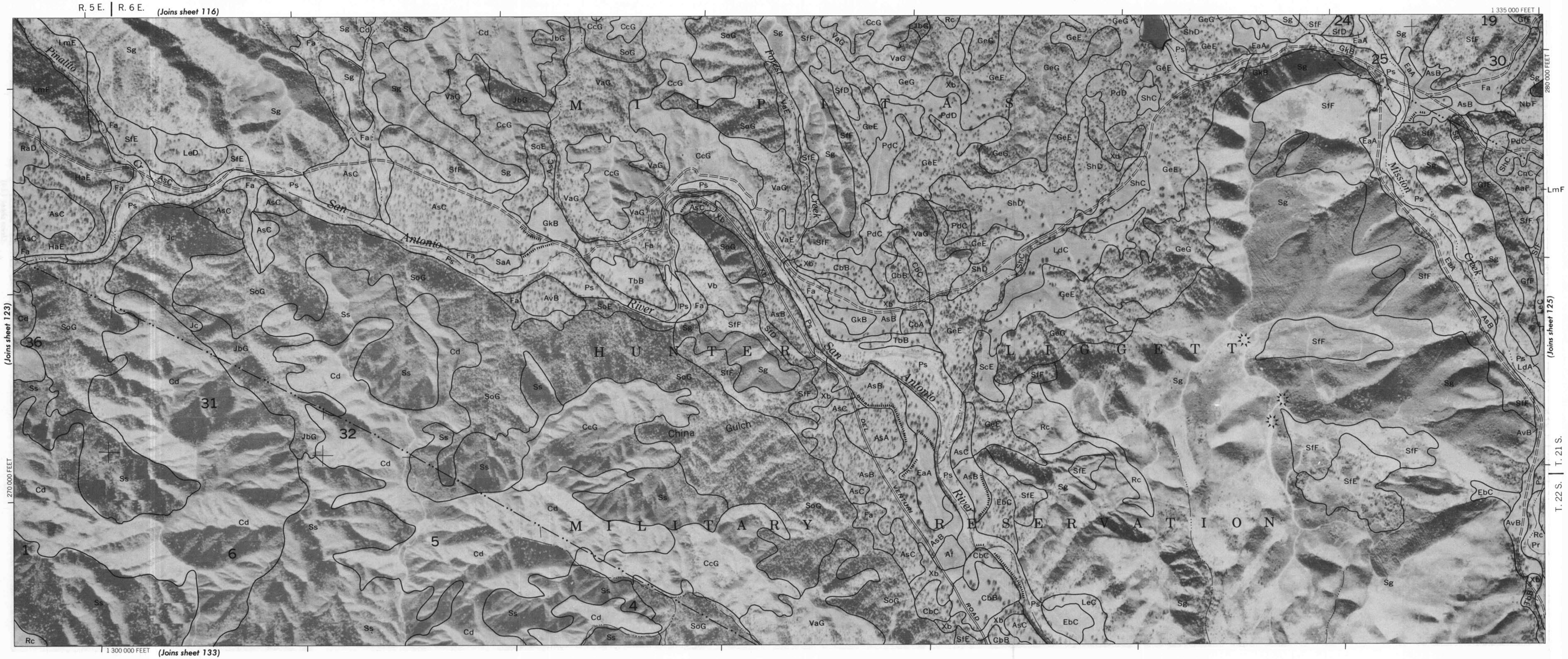
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 124

N



1 ¾ ½ ¼ 0 1 2 Miles

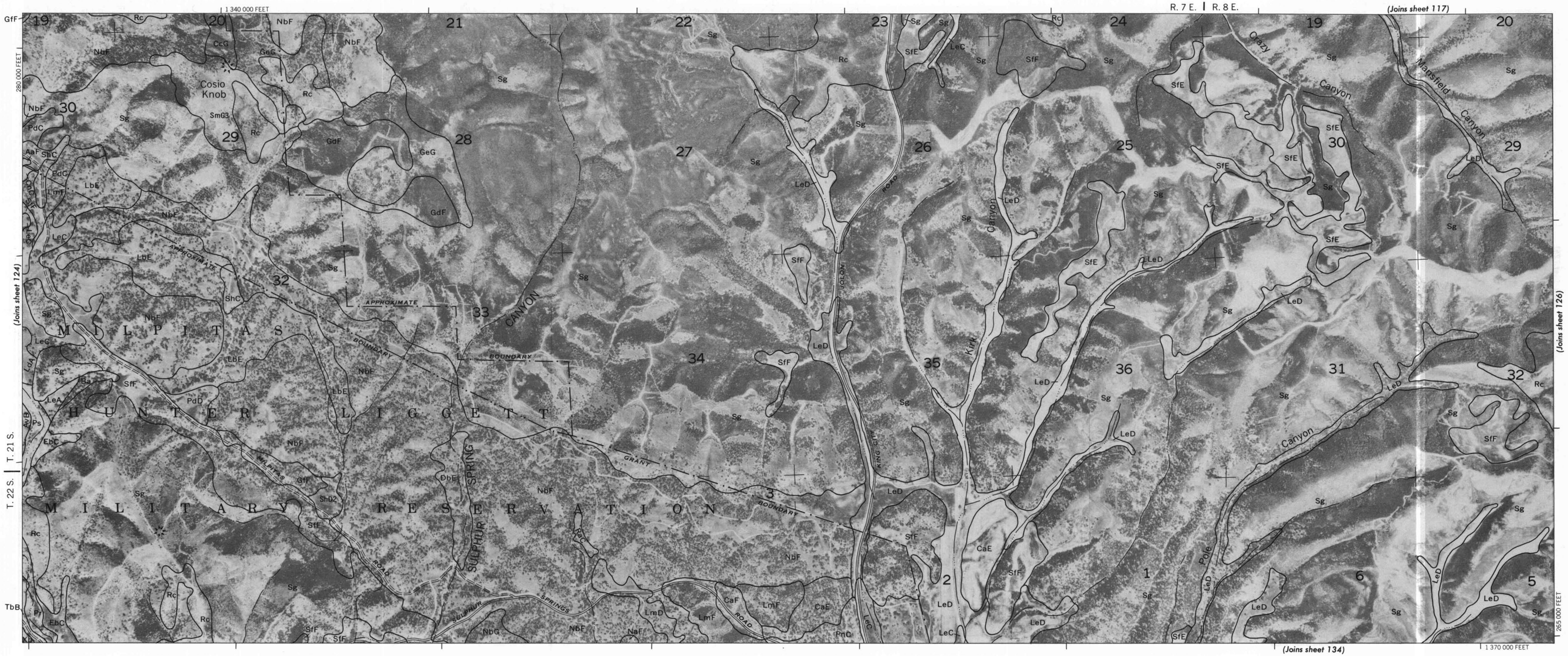
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA NO. 125

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

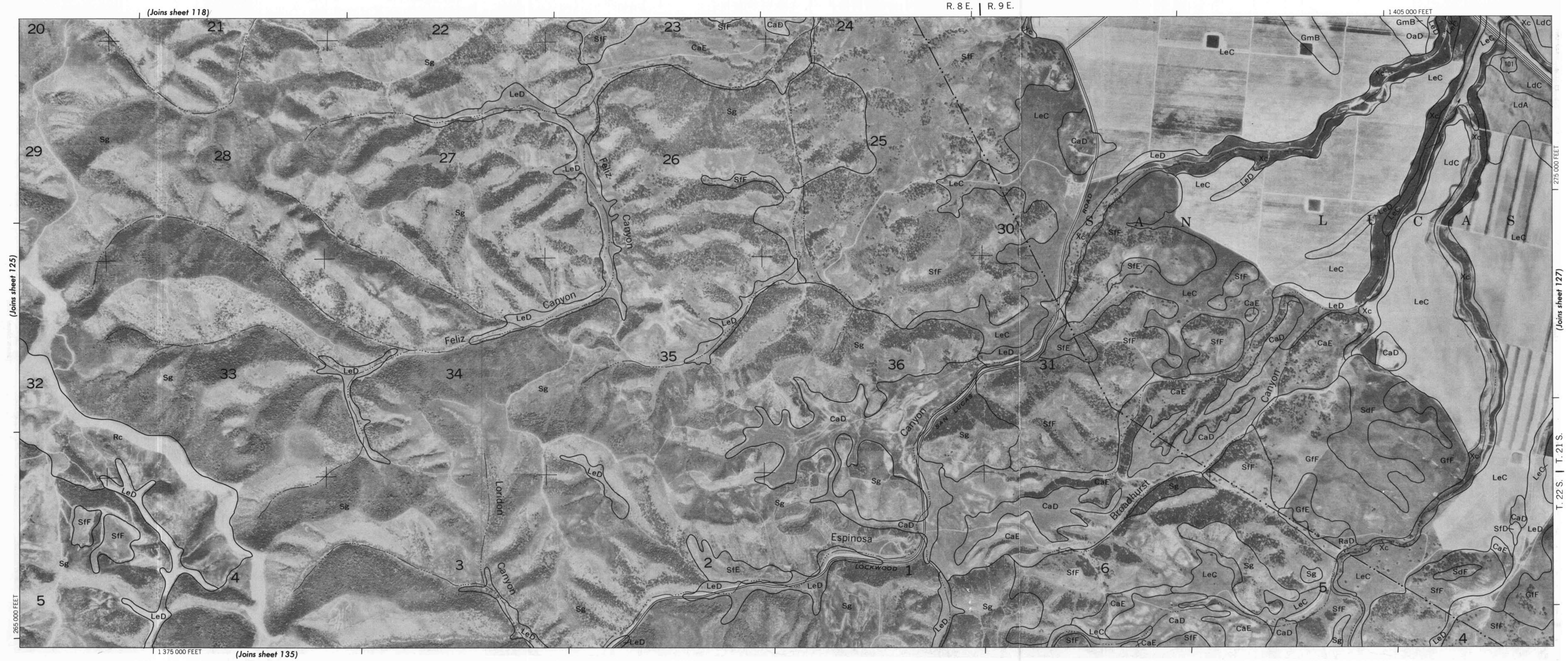


1	¾	½	¼	0		1		2 Miles
5000	4000	3000	2000	1000	0	5000		10000 Feet

Scale 1:24000

N

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 126



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

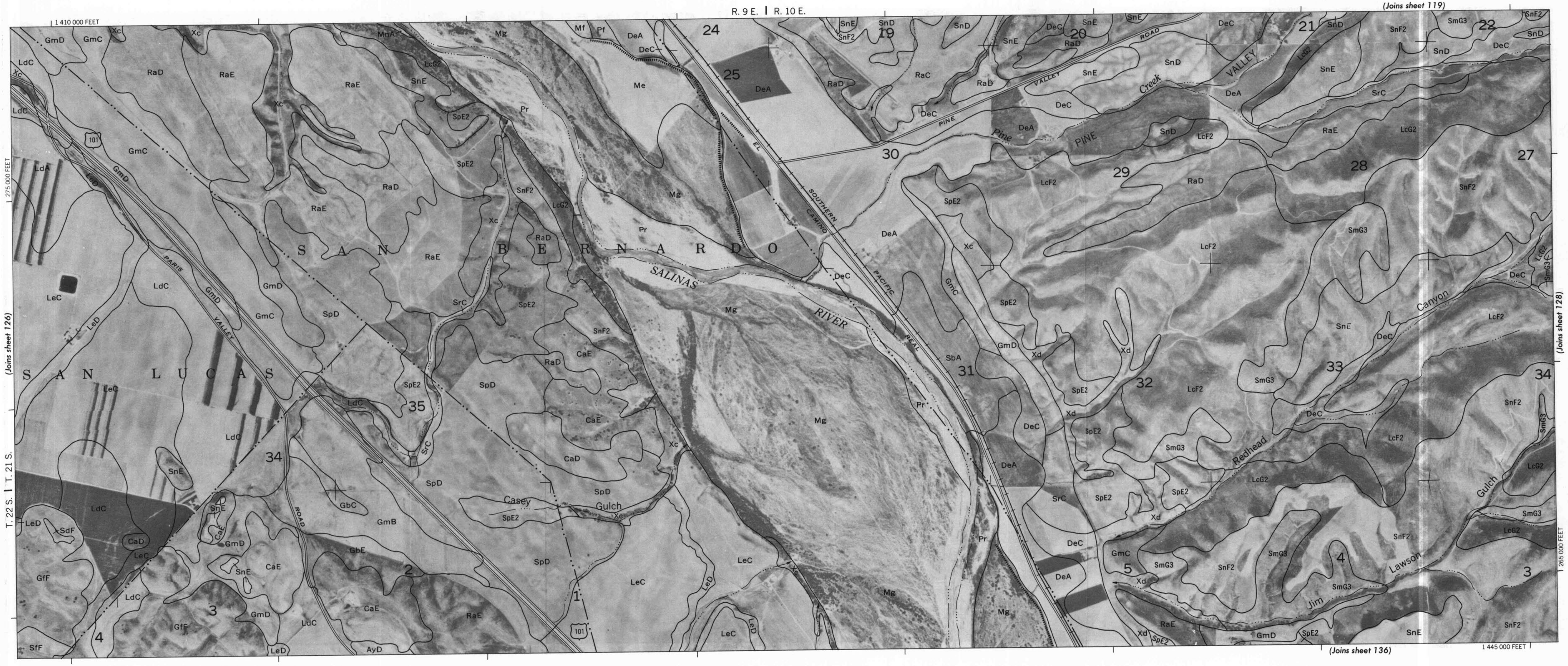
This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

127

N

MONTEREY COUNTY, CALIFORNIA NO. 127

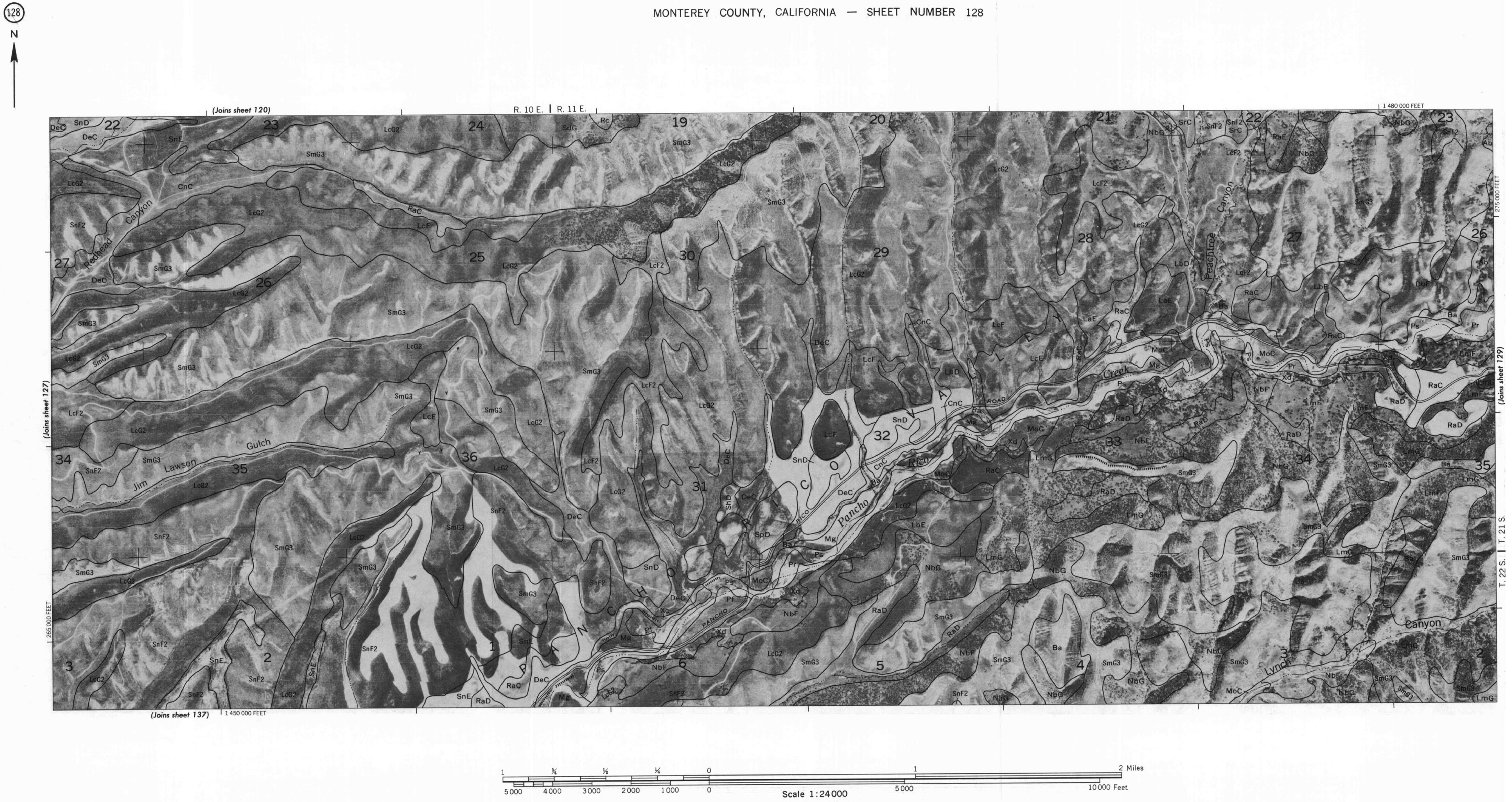
This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

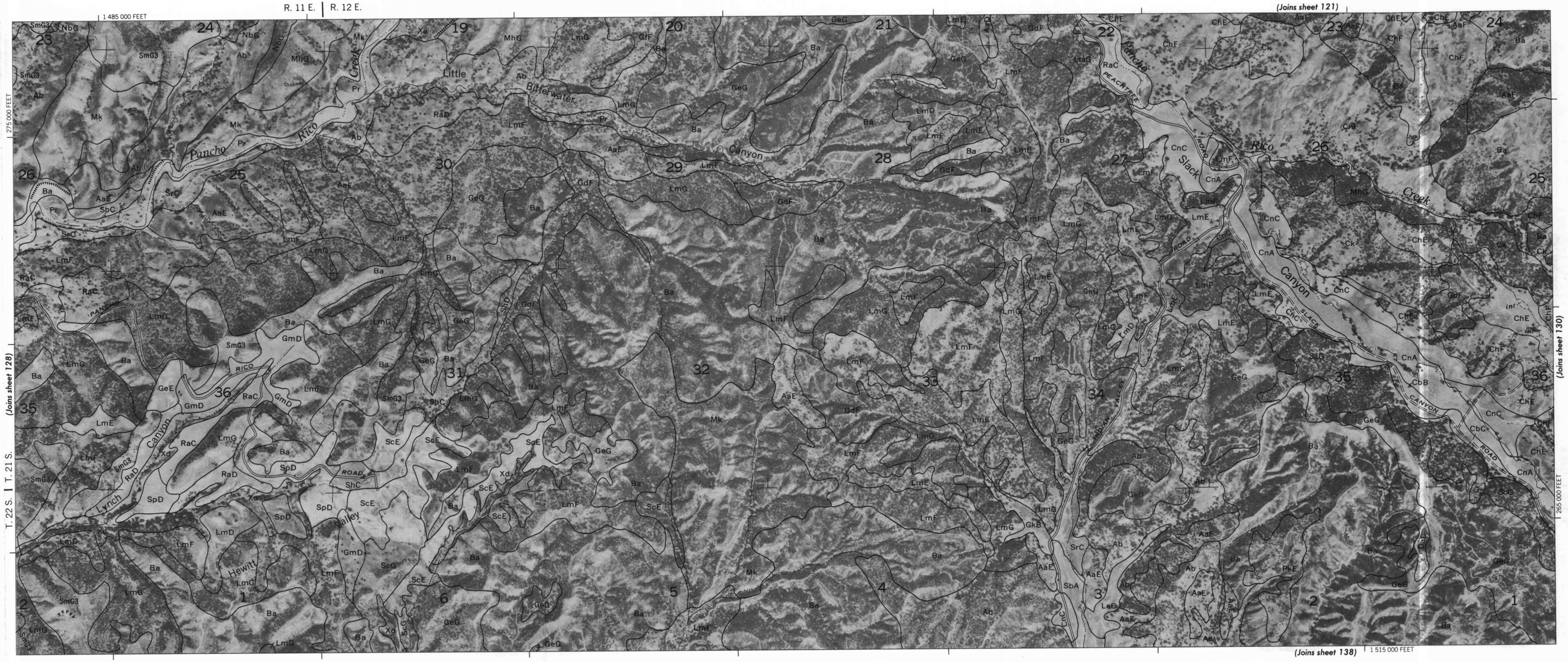


This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

MONTEREY COUNTY, CALIFORNIA NO. 129

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

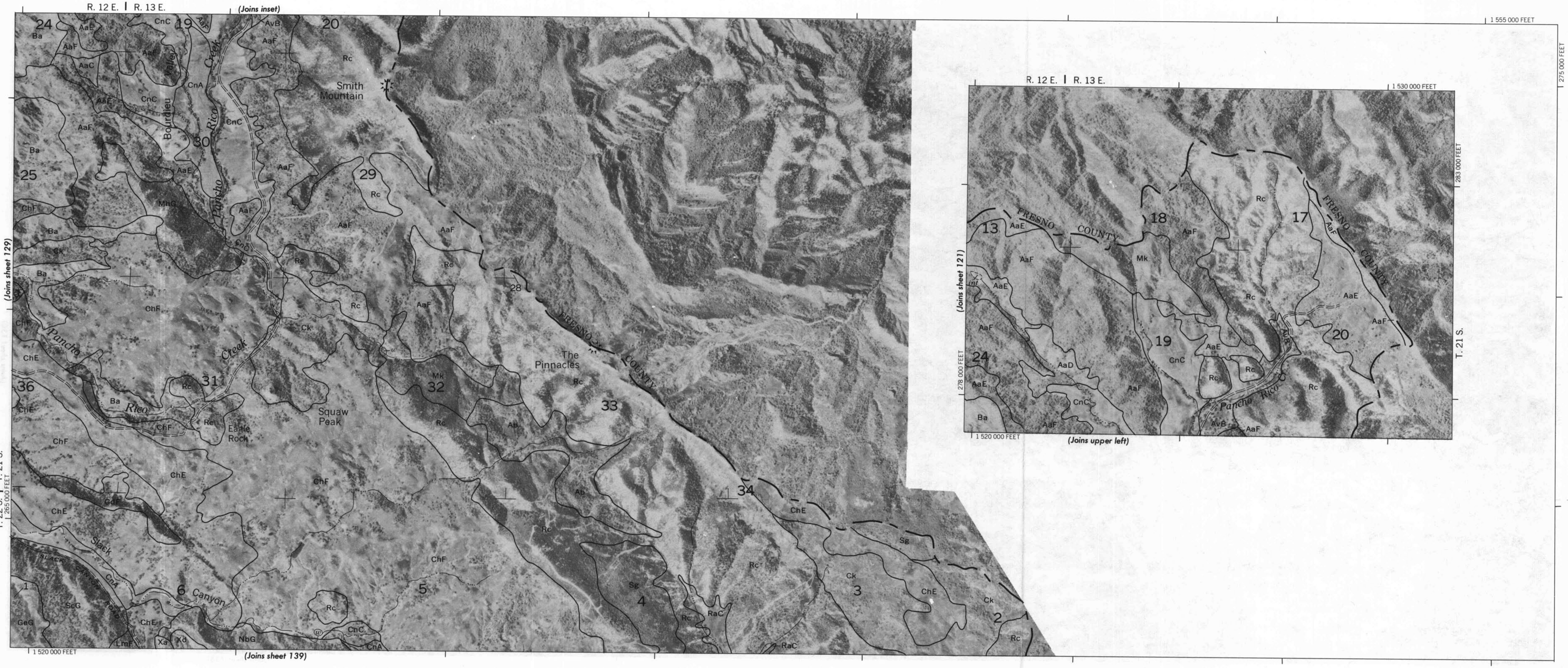


1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 130



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

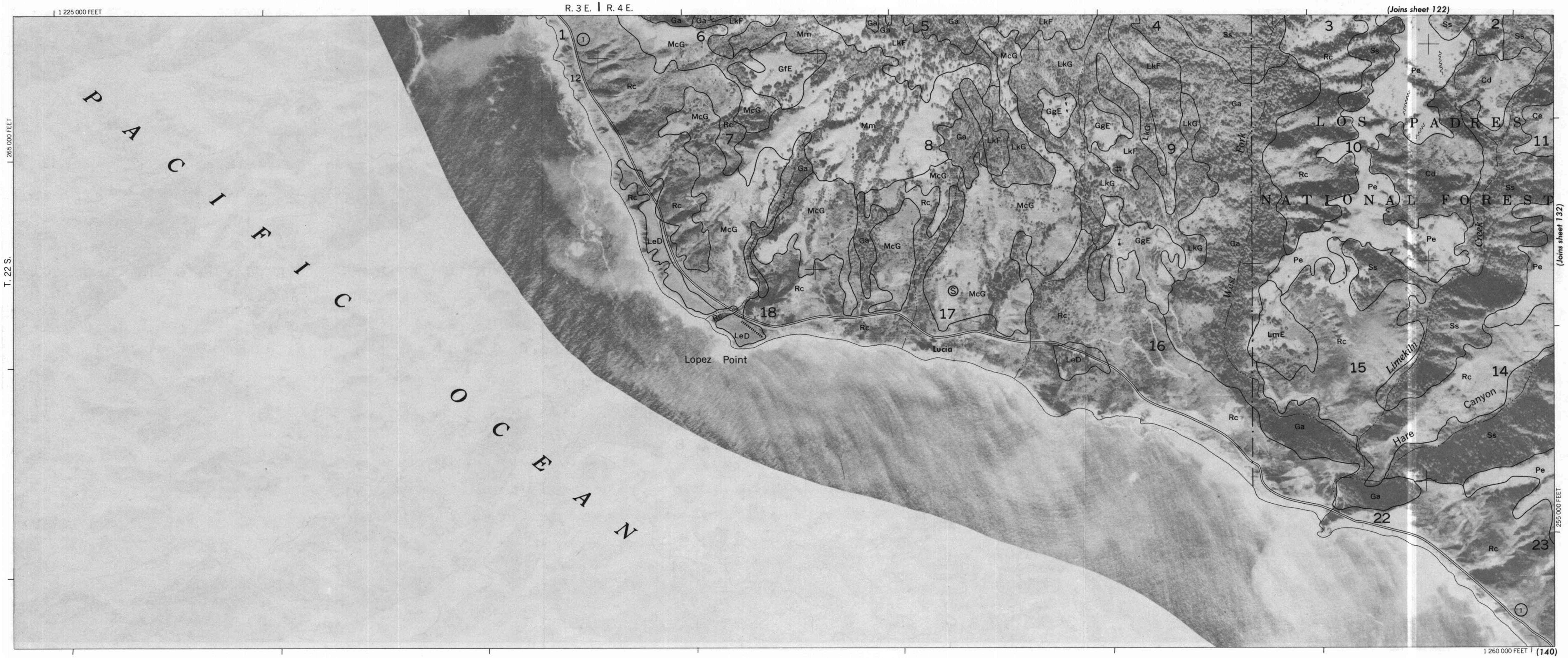
This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

131

N

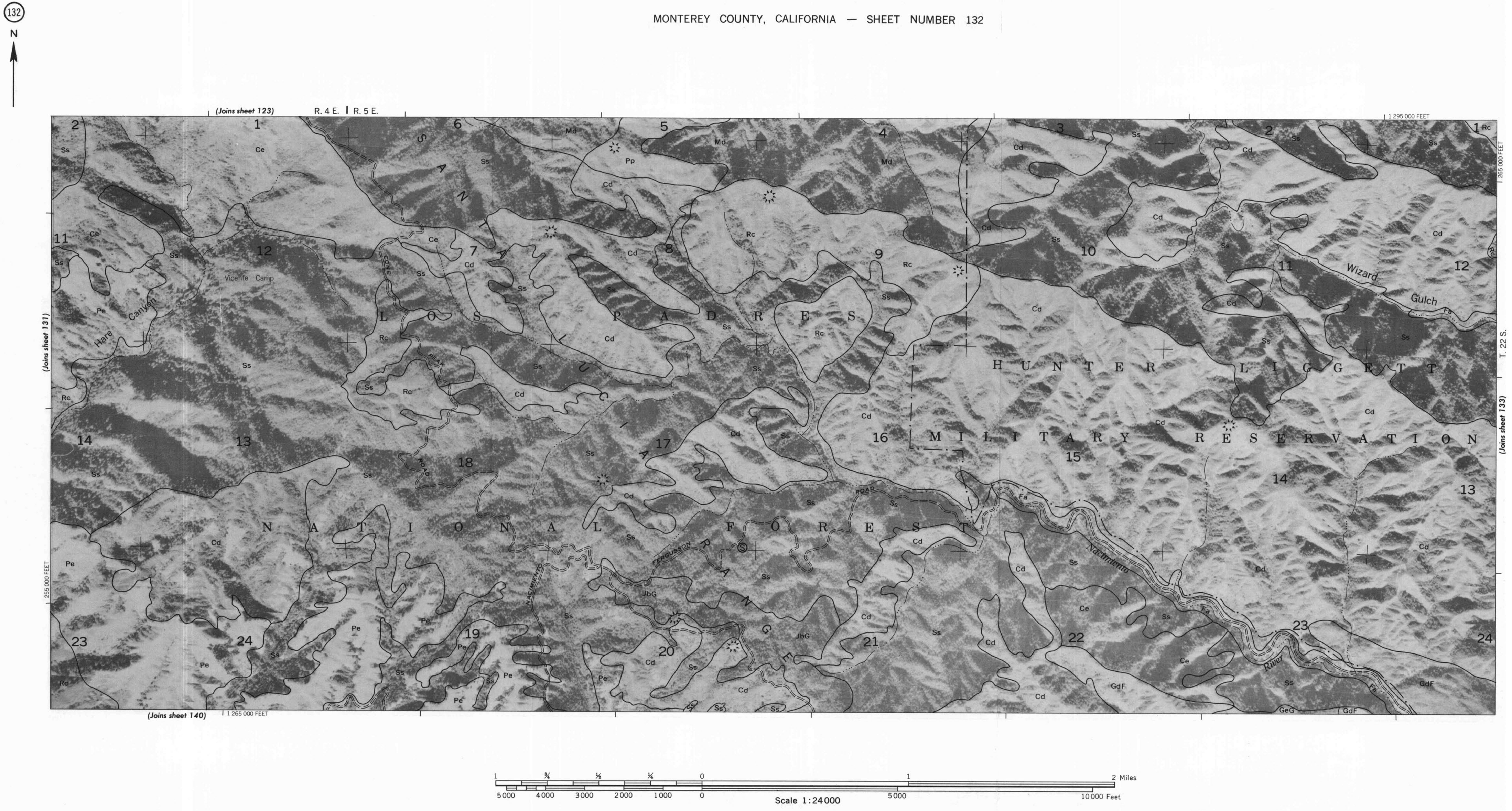
MONTEREY COUNTY, CALIFORNIA NO. 131

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



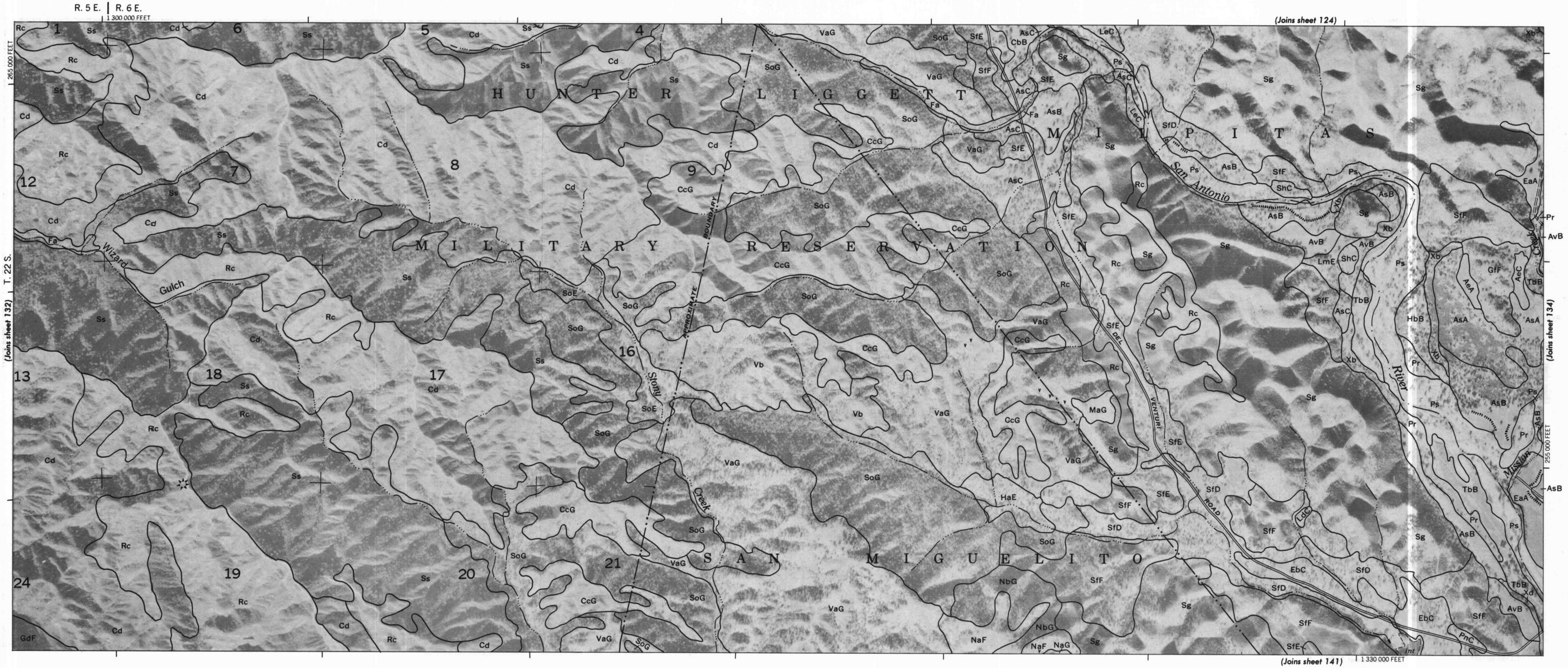
1 ¾ ½ ¼ 0 1 2 Miles
5000 4000 3000 2000 1000 0 5000 10000 Feet
Scale 1:24000

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 132



This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

MONTEREY COUNTY, CALIFORNIA NO. 133

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

134

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

TEREY COUNTY, CALIFORNIA NO. 135

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

N

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 136

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

137

N

Scale 1:24 000

1 ¾ ½ ¼ 0 1 2 Miles

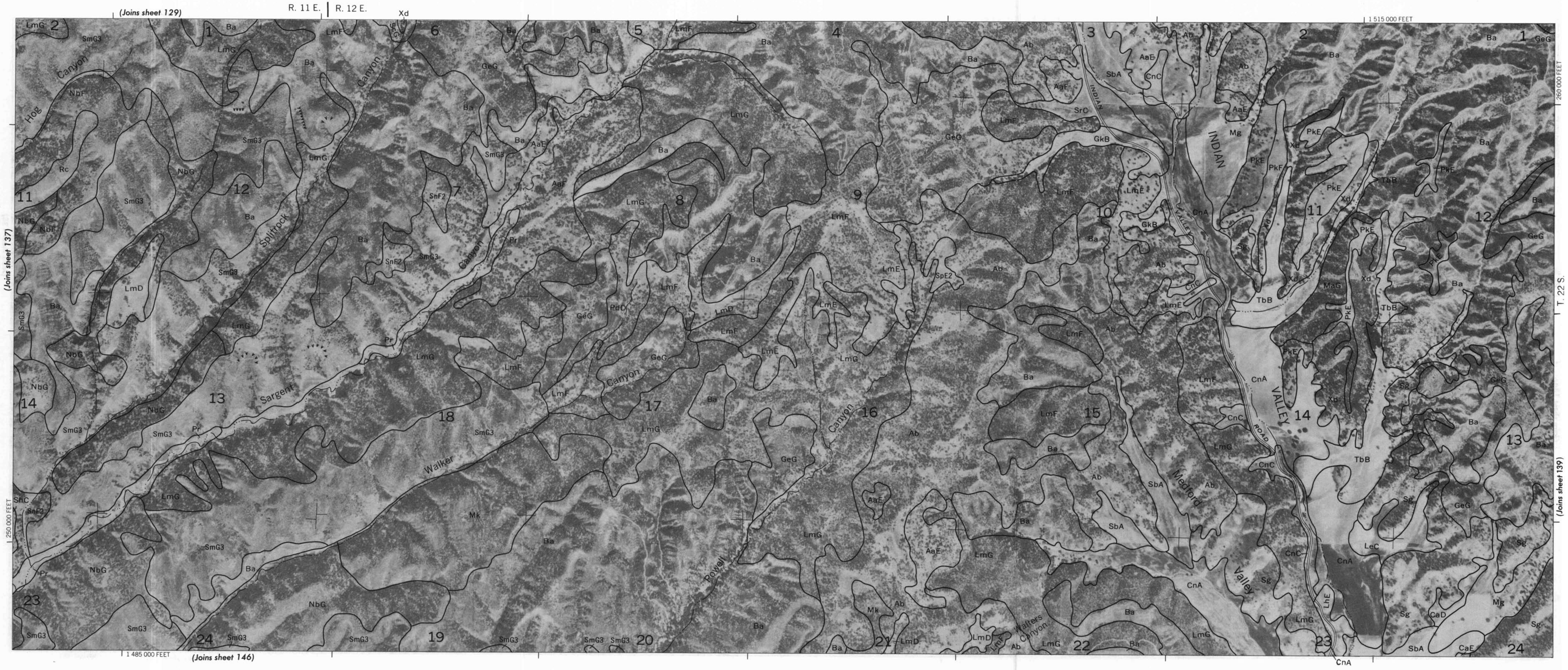
5000 4000 3000 2000 1000 0 5000 10000 Feet

MONTEREY COUNTY, CALIFORNIA NO. 137

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 138

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

139

N

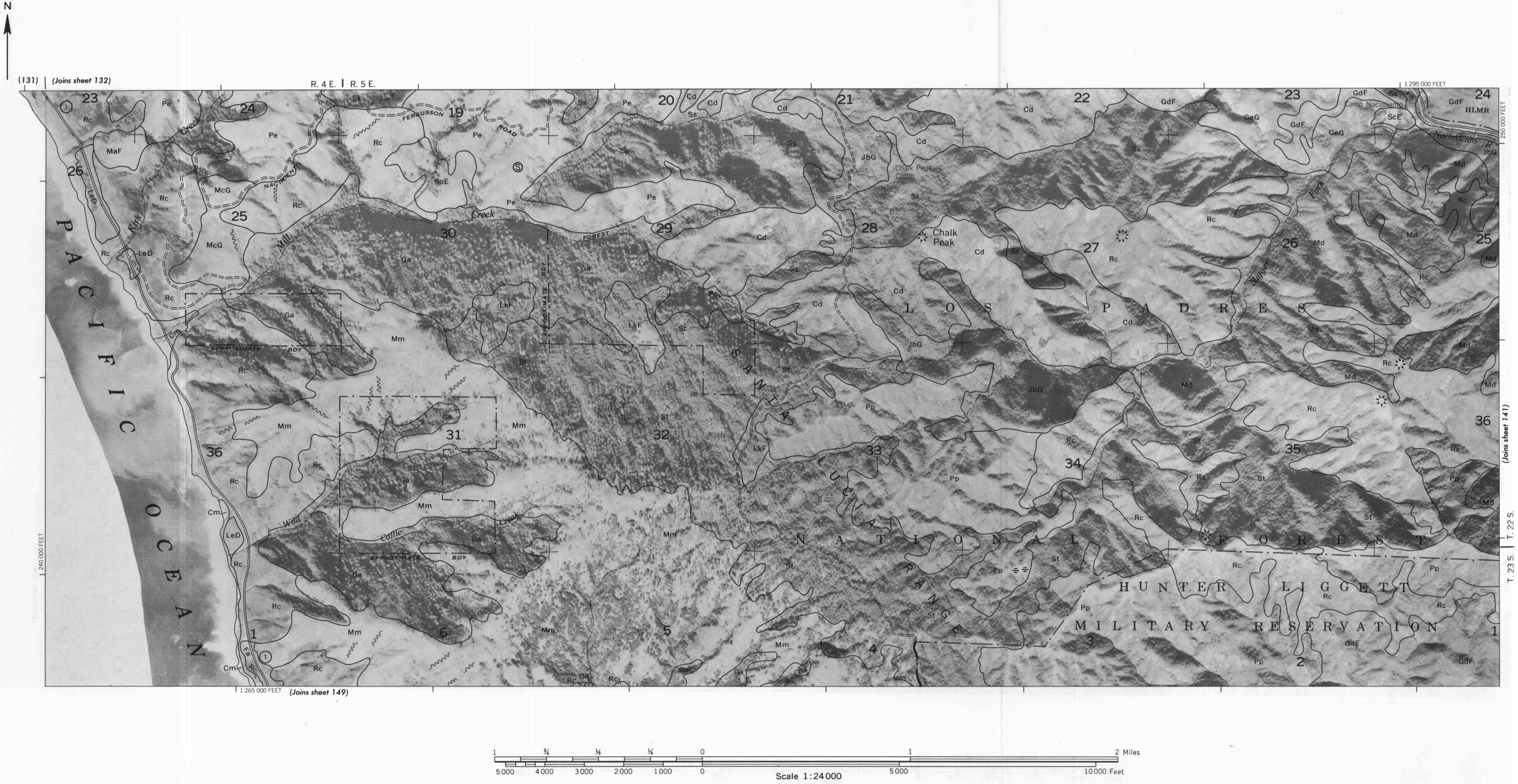
MONTEREY COUNTY, CALIFORNIA NO. 139

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

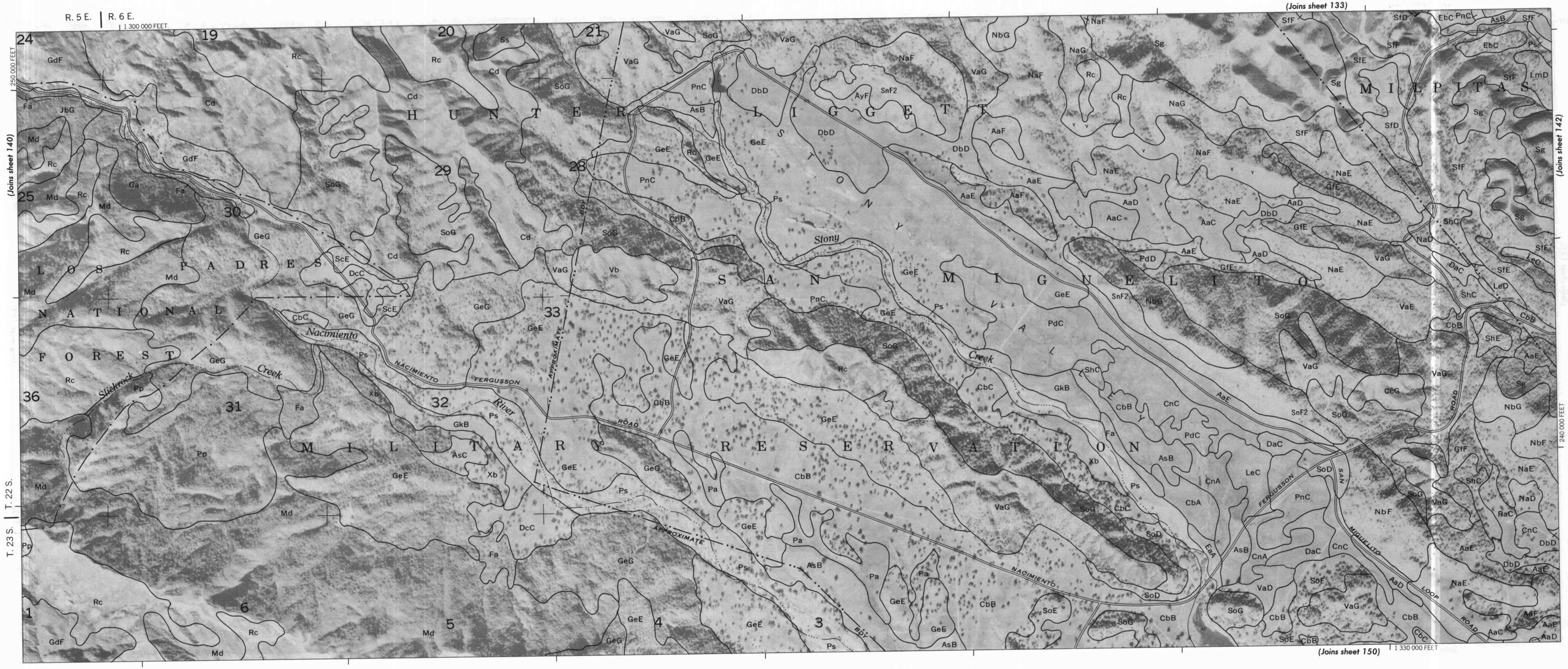


This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

MONTEREY COUNTY, CALIFORNIA NO. 141

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.



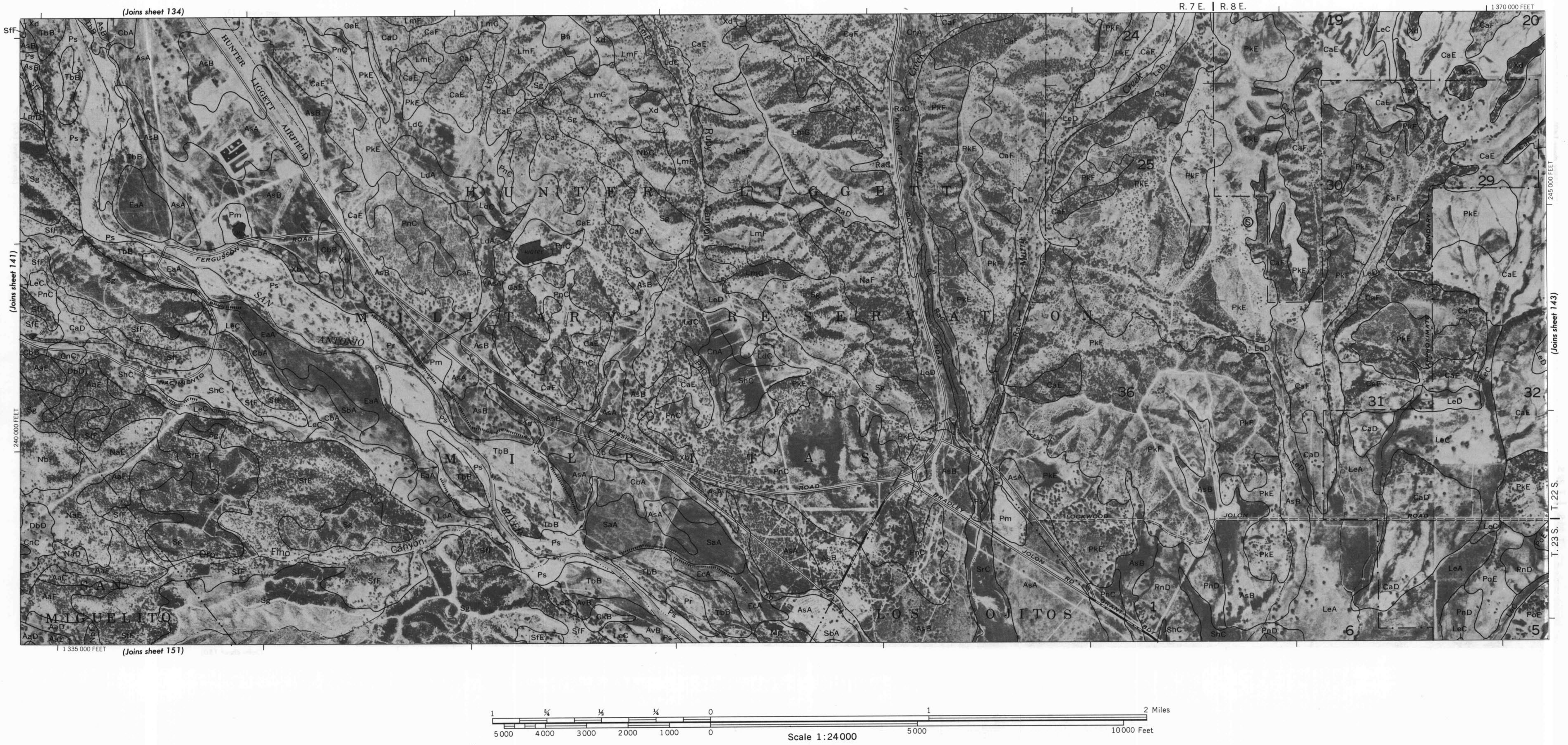
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

N

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 142



This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

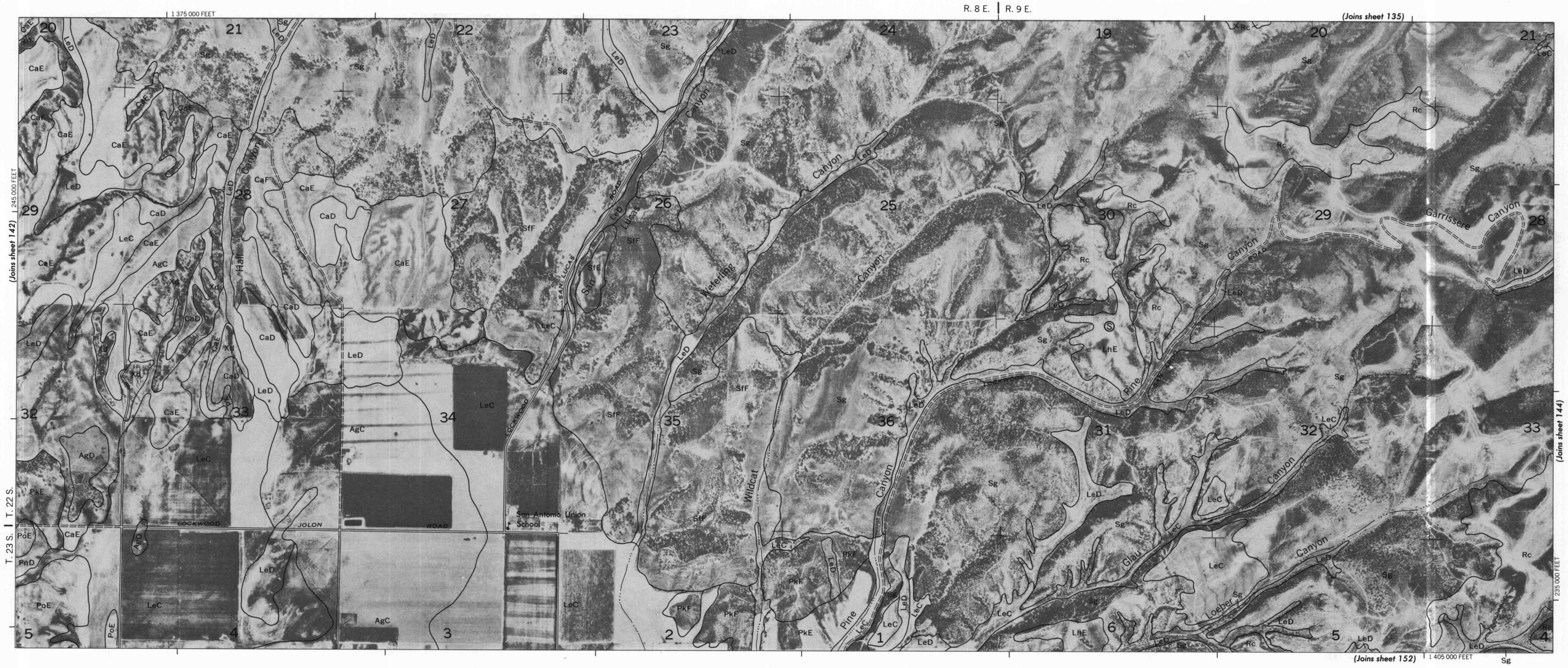
MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 143

143

N

MONTEREY COUNTY, CALIFORNIA NO. 143

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



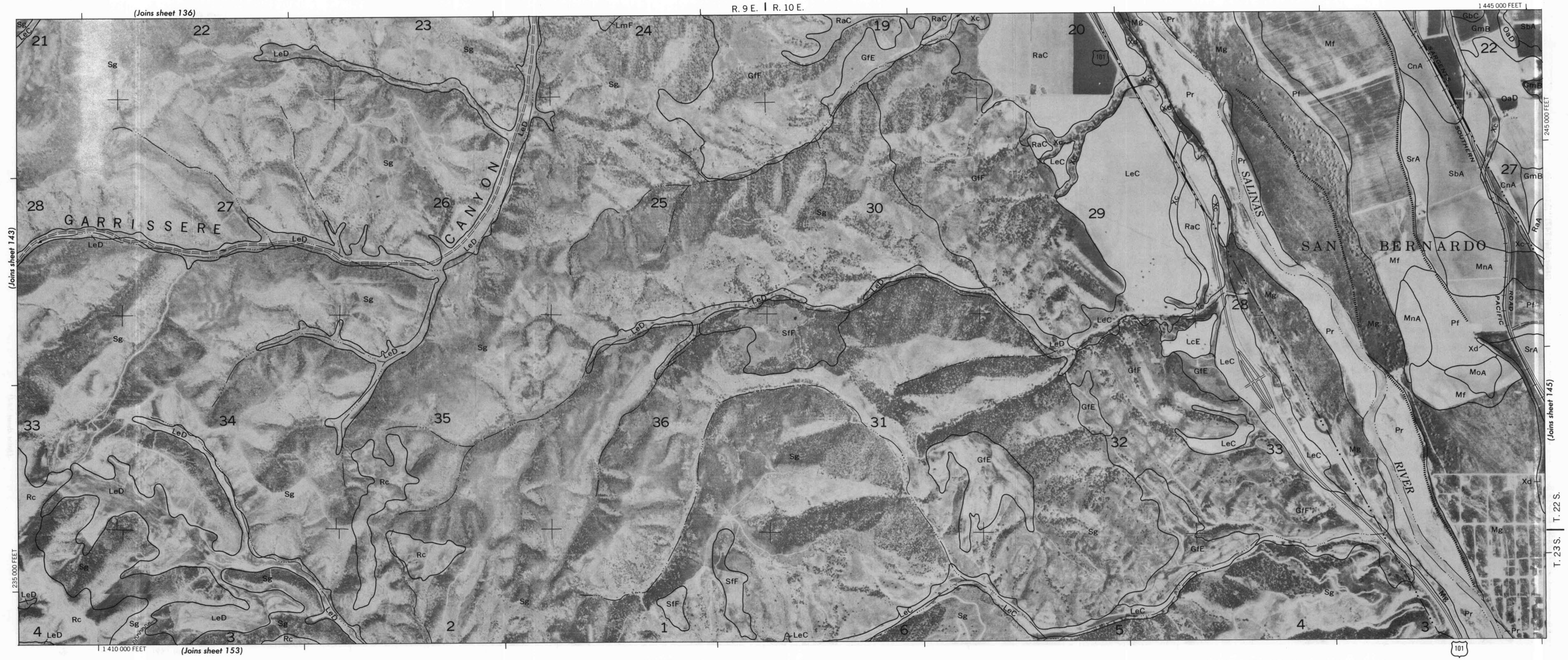
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

N

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 144



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

145

N

MONTEREY COUNTY, CALIFORNIA NO. 145

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

N

R. 11 E. | R. 12 E.

(Joins sheet 138)

1 515 000 FEET

(Joins sheet 145)

(Joins sheet 147)

245 000 FEET

235 000 FEET

T. 22 S. | T. 23 S.

1 485 000 FEET

(Joins sheet 155)

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

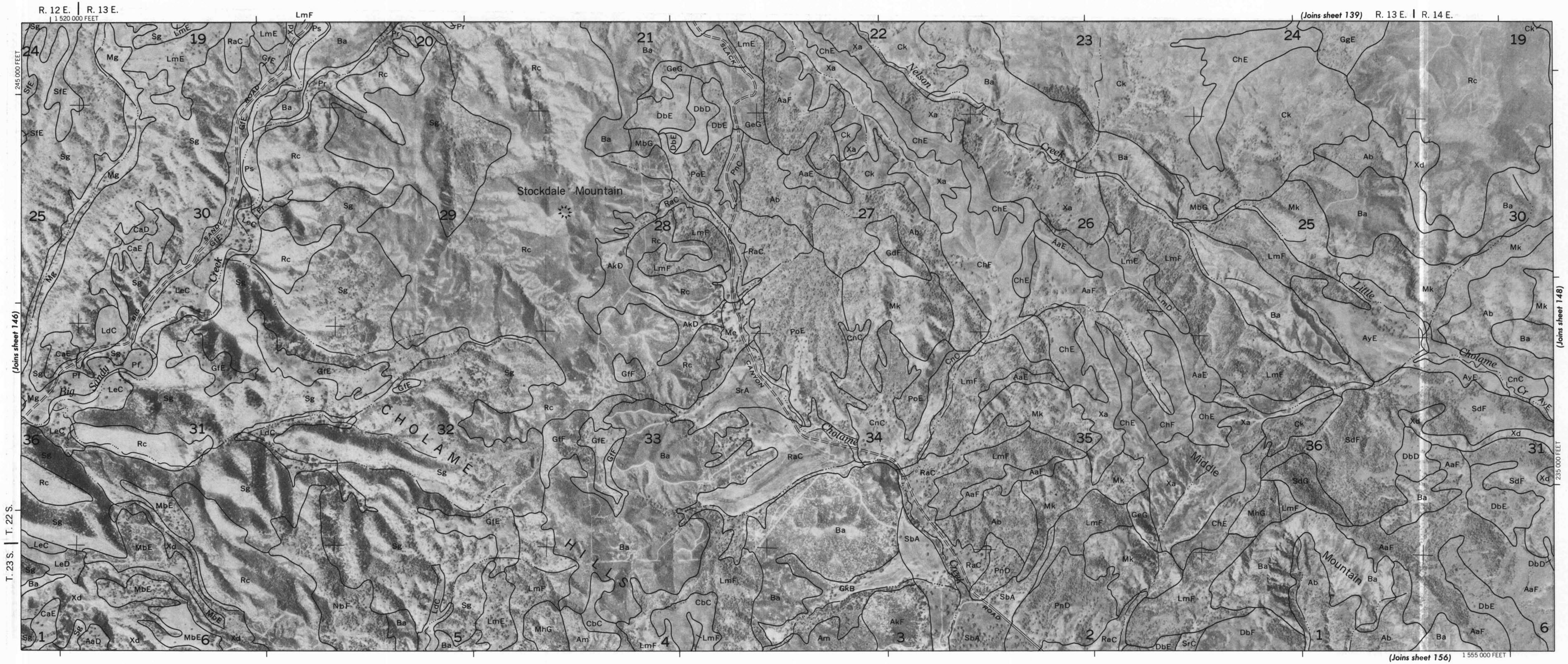
Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

MONTEREY COUNTY, CALIFORNIA NO. 147

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 148

N

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

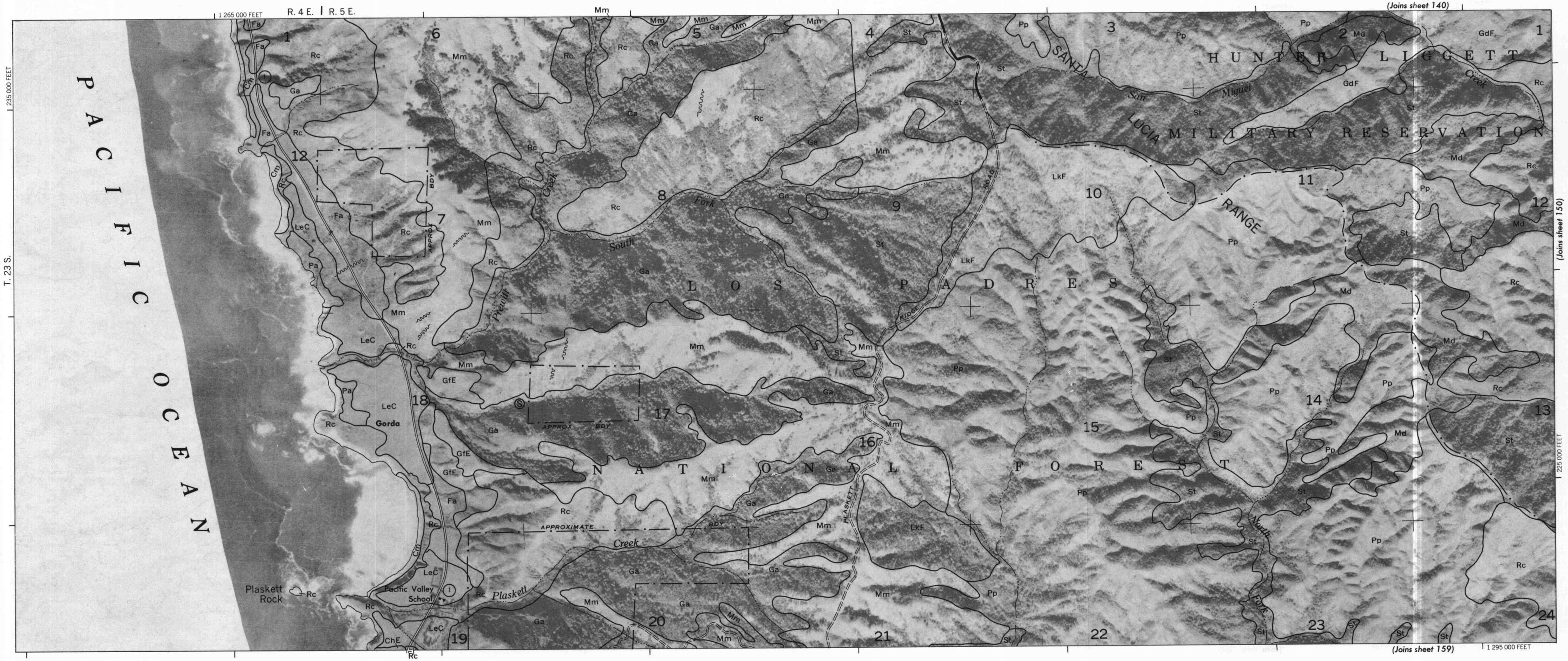
This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

149

N

MONTEREY COUNTY, CALIFORNIA NO. 149

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

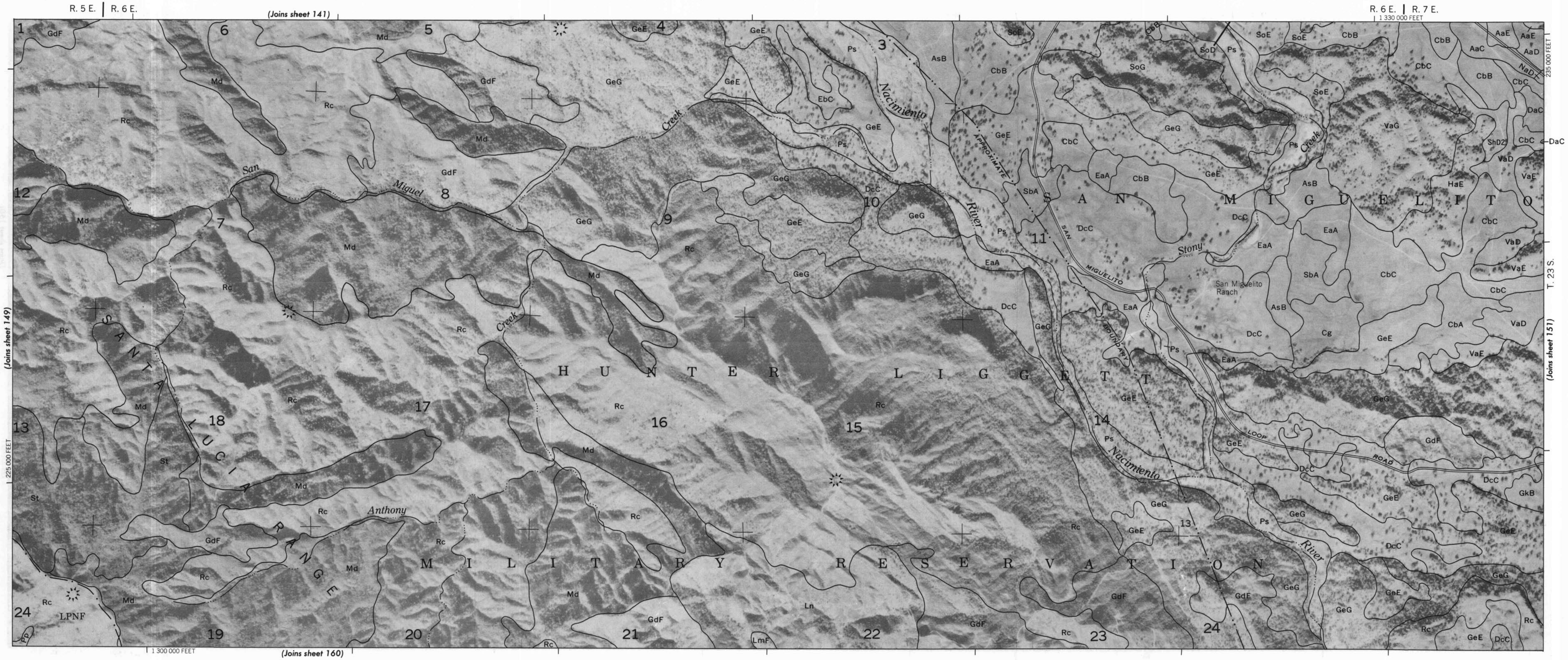


1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 150



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

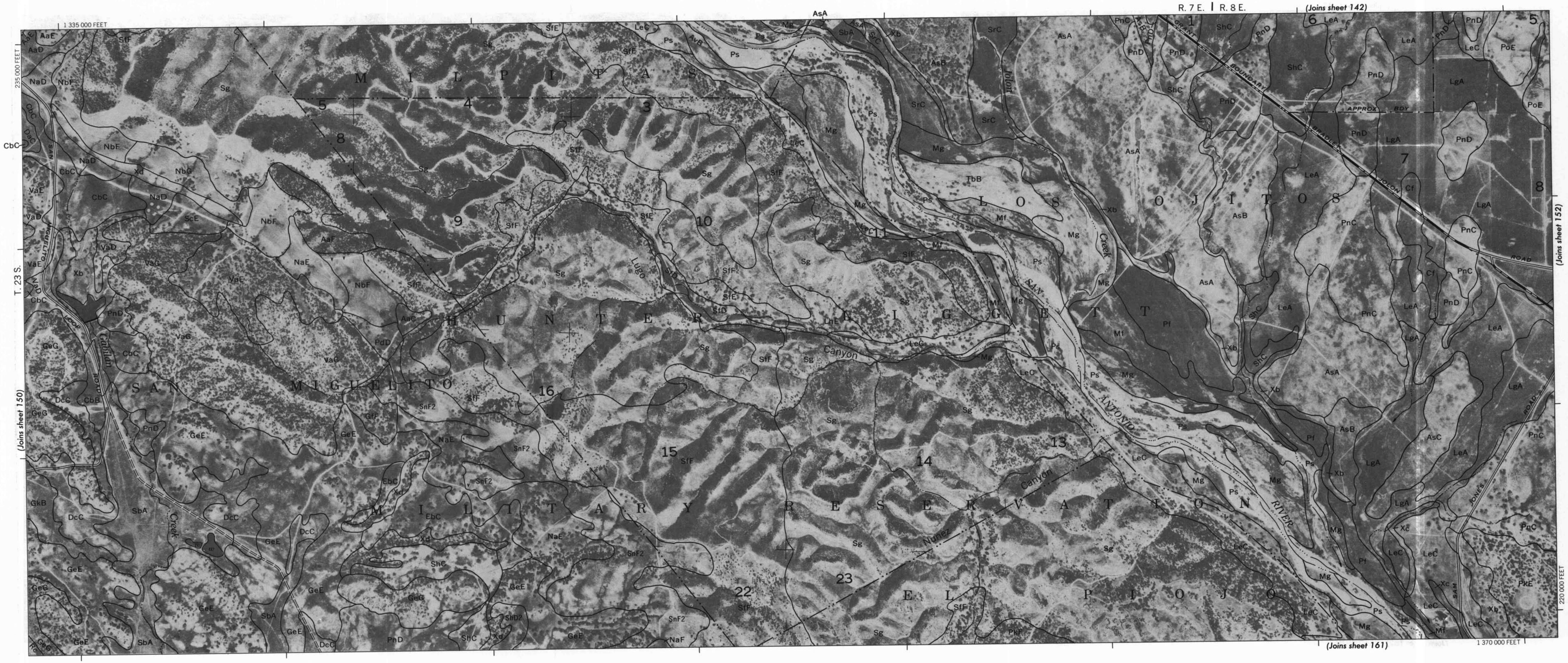
Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

151

N

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



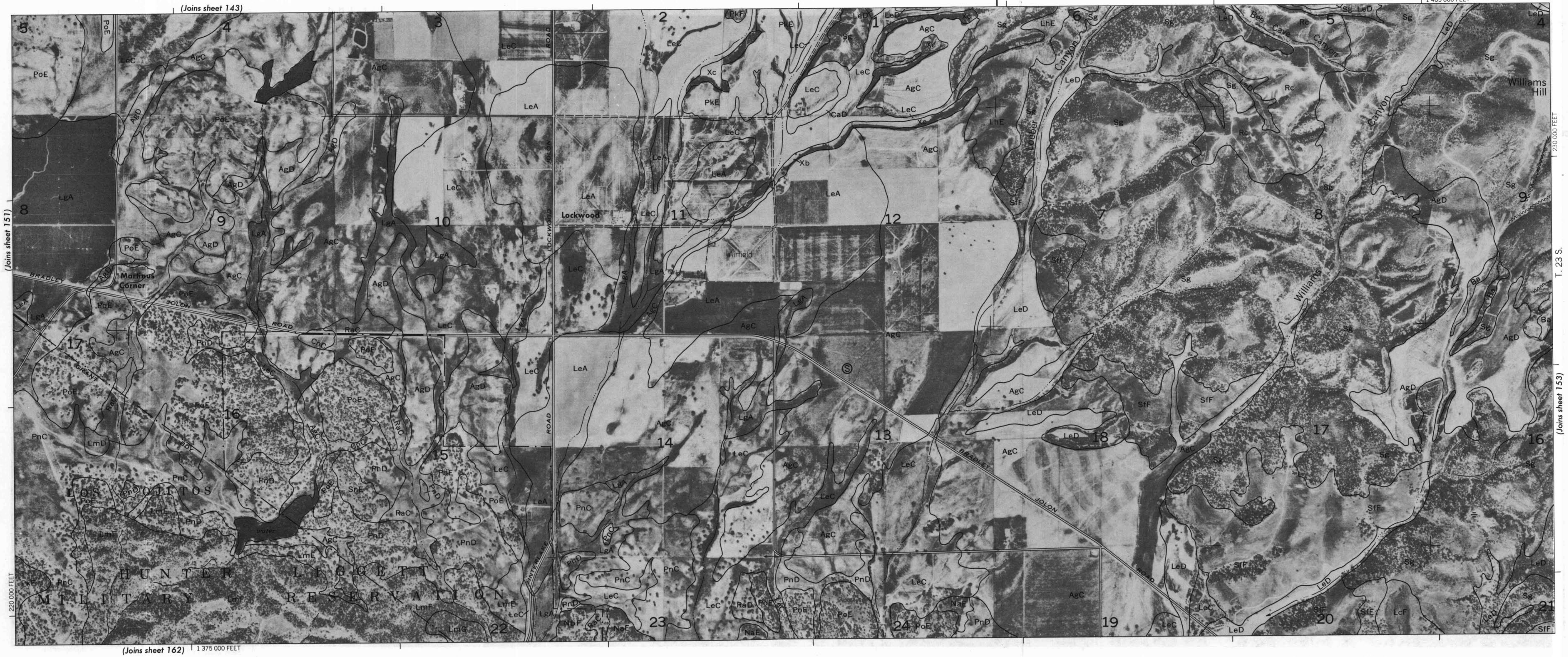
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

N

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 152



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

153

N

MONTEREY COUNTY, CALIFORNIA NO. 153

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

154

N

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 154

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

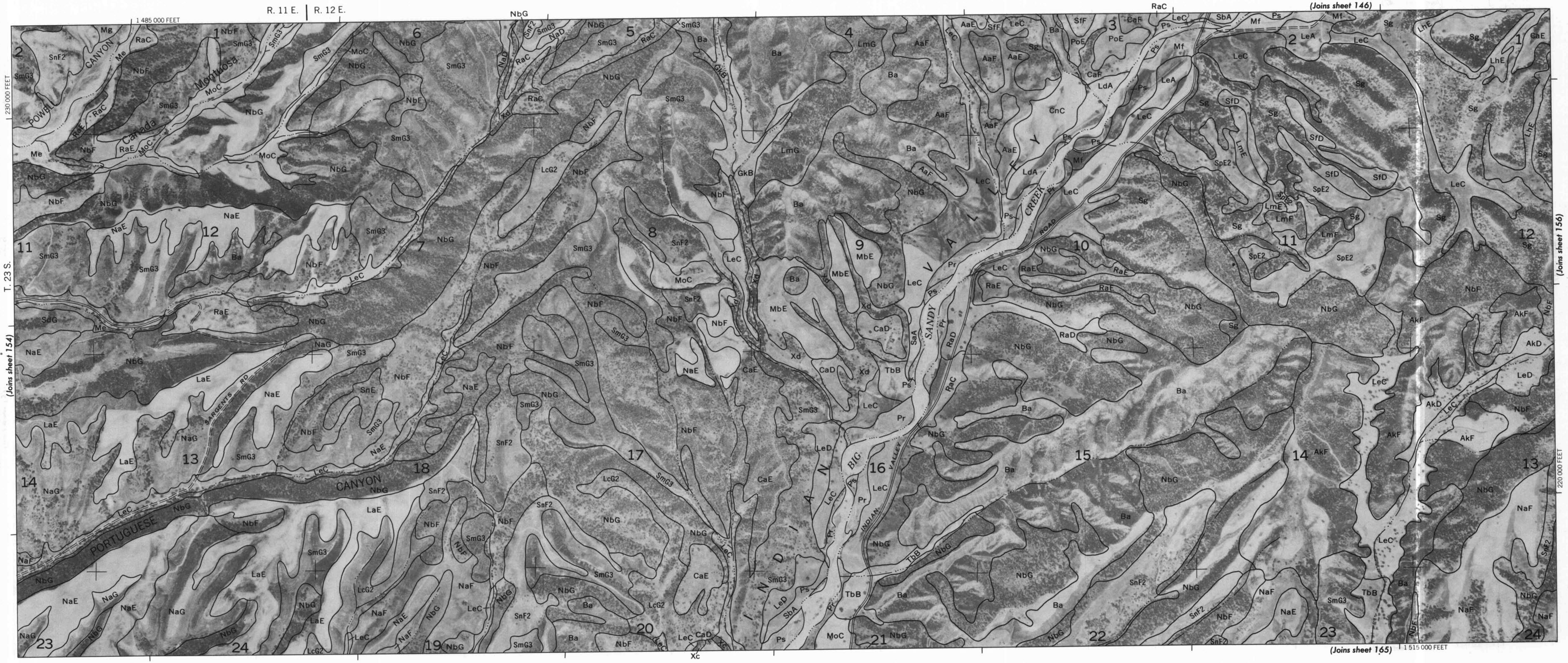
This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA NO. 154

155

N

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 156

N

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

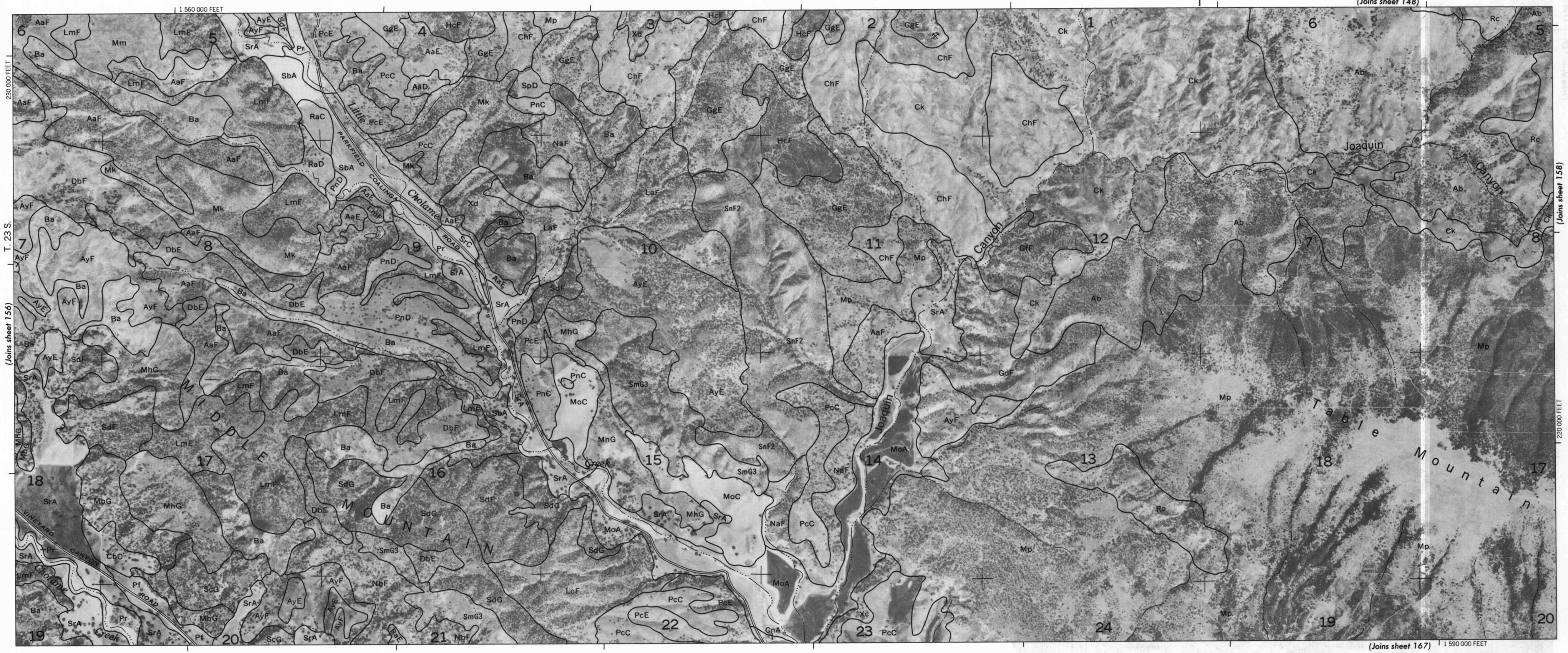
This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA NO. 156

157

N

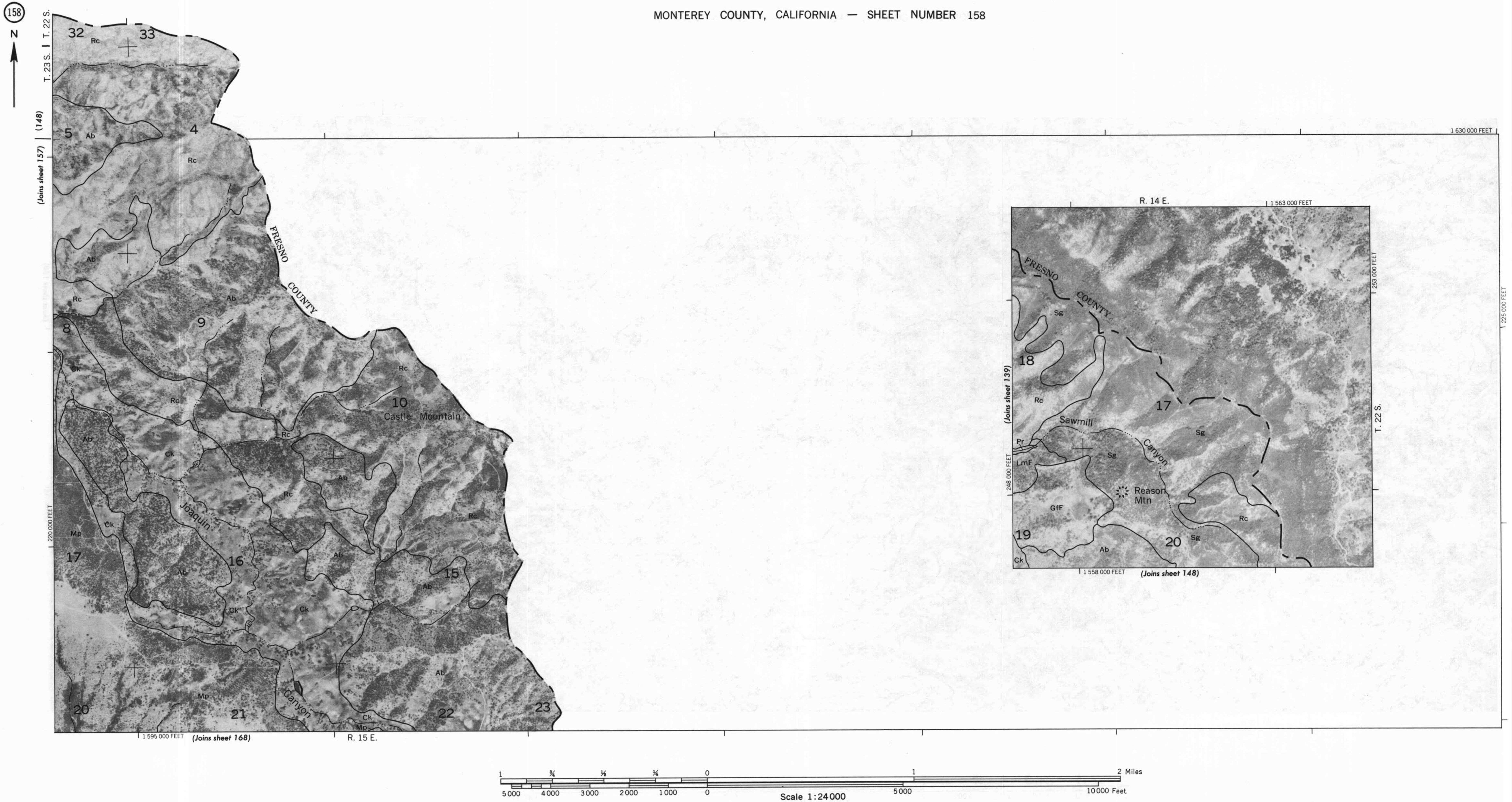
This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

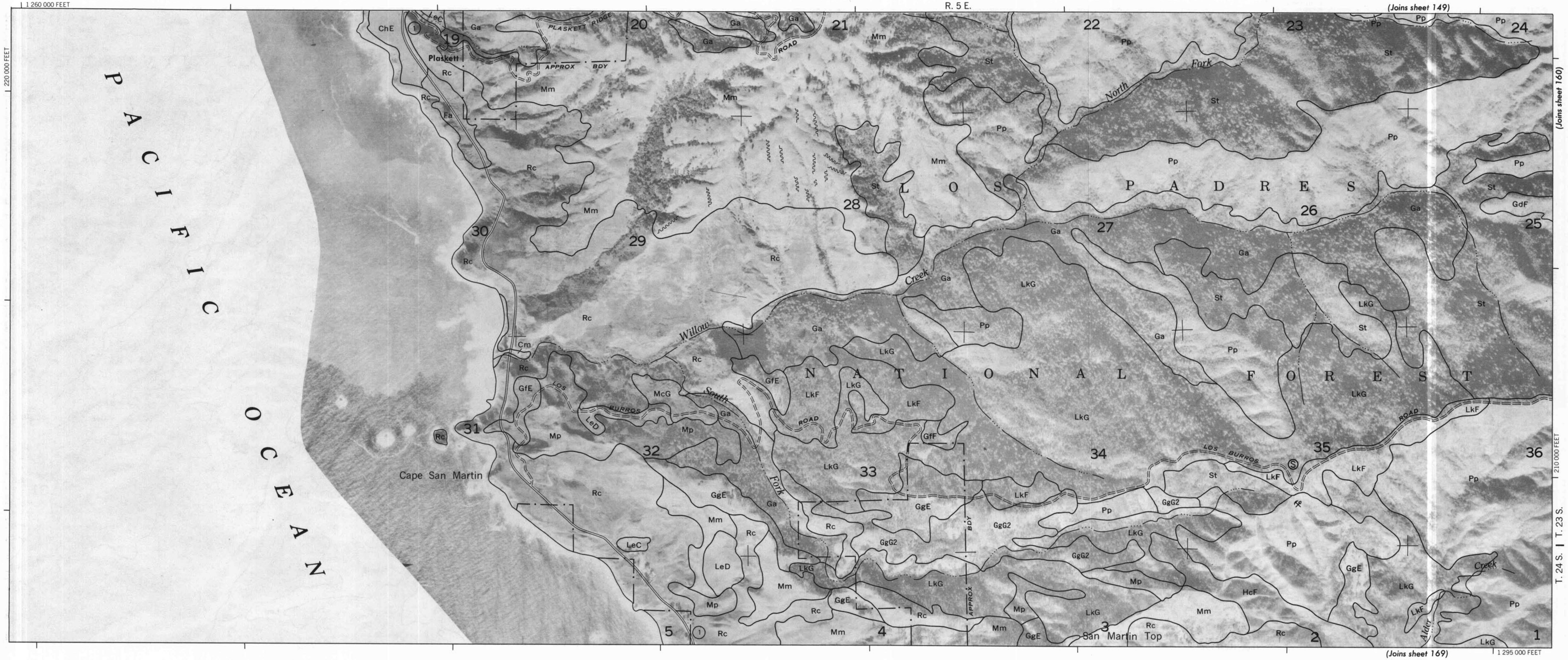


Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

159

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

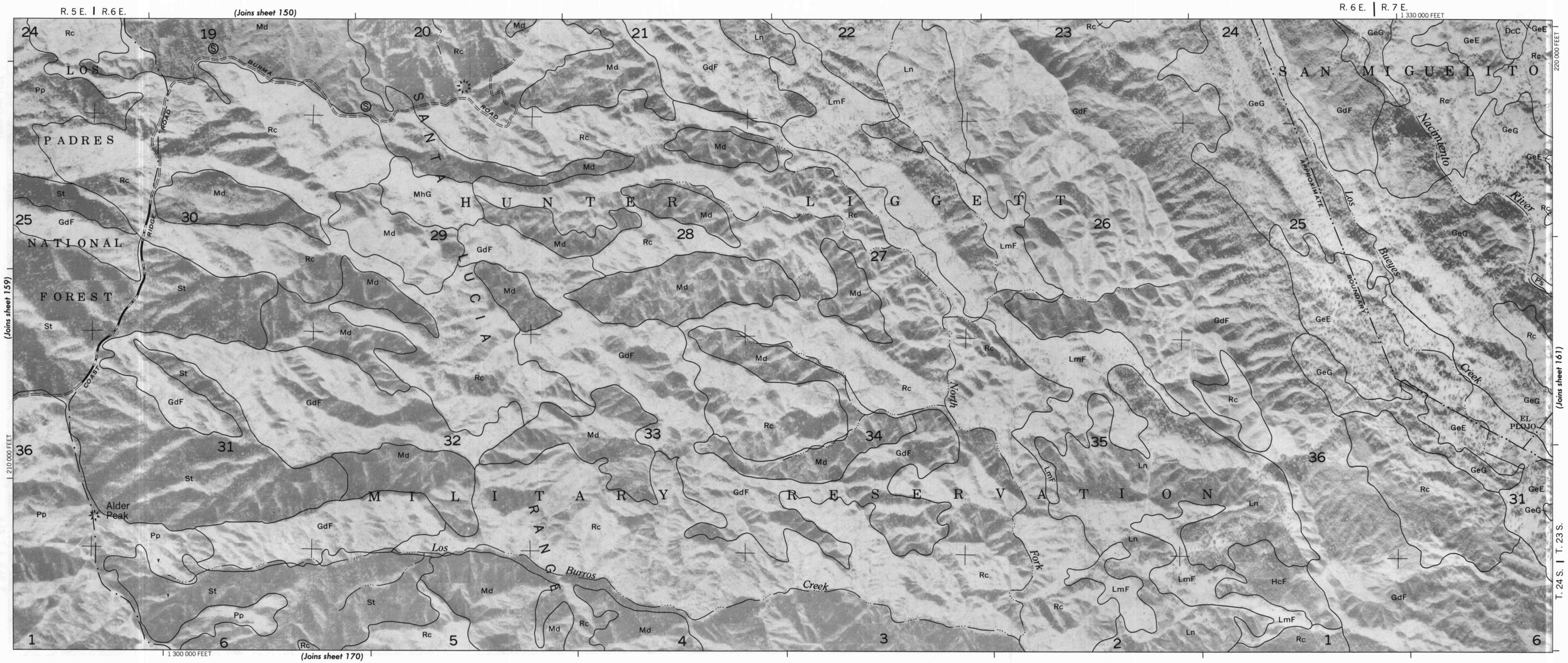
Scale 1:24000

MONTEREY COUNTY, CALIFORNIA NO. 159

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 160

N



1 ¾ ½ ¼ 0 1 2 Miles

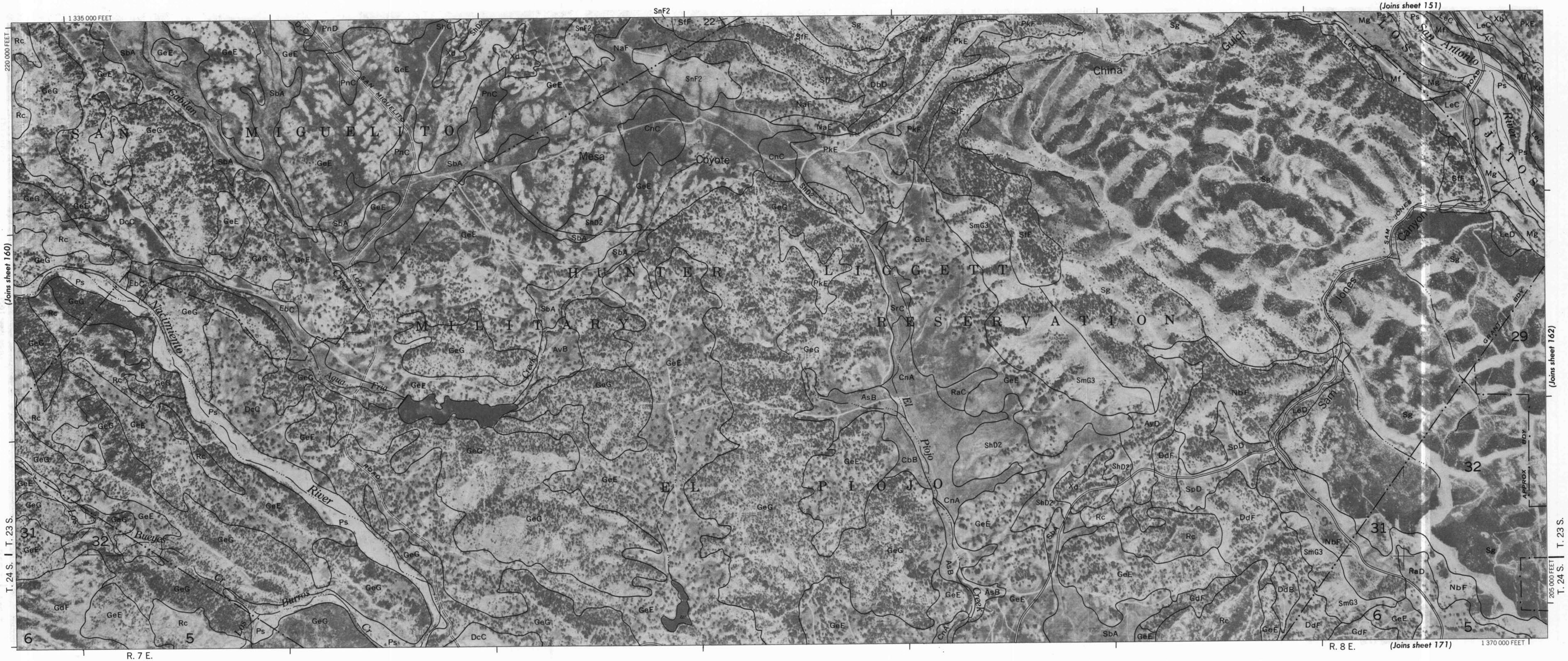
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

161

N



1 ¾ ½ ¼ 0 1 2 Miles

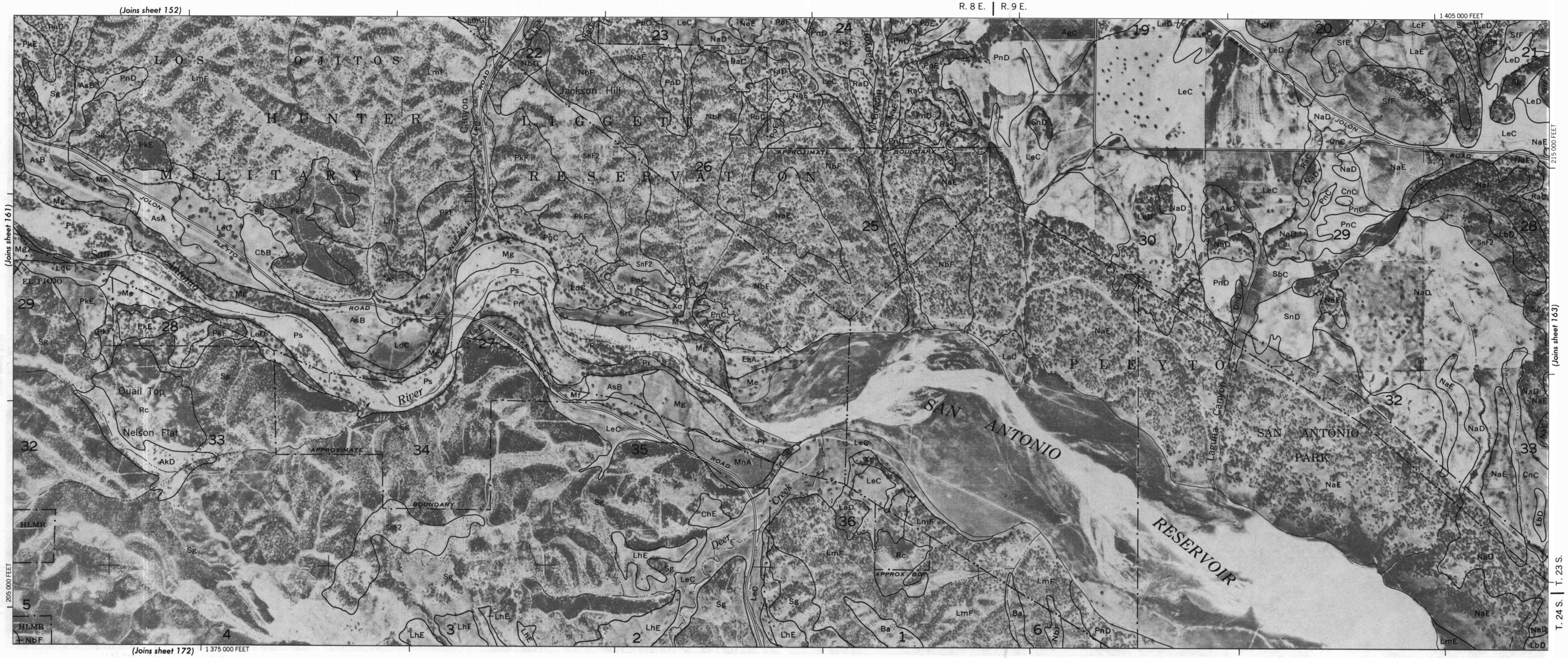
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

MONTEREY COUNTY, CALIFORNIA NO. 161

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 162



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA NO. 162

N

MONTEREY COUNTY, CALIFORNIA NO. 163

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

Scale 1:24 000

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

N

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 164

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

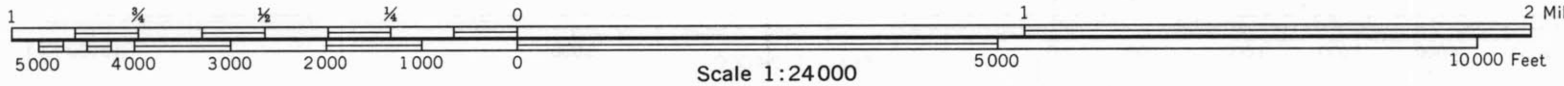
Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

MONTEREY COUNTY, CALIFORNIA NO. 165

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



Scale 1:24000

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 166

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

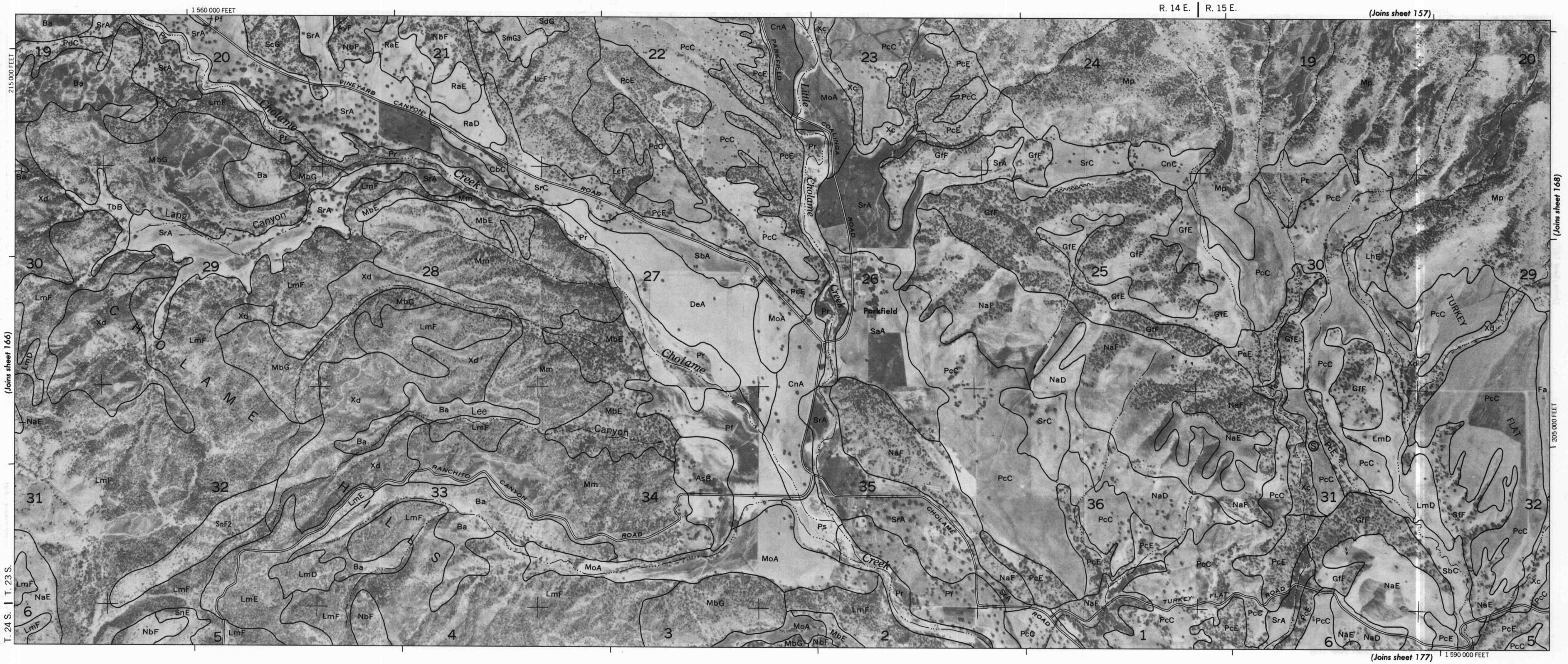
This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA NO. 166

N

MONTEREY COUNTY, CALIFORNIA NO. 167

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



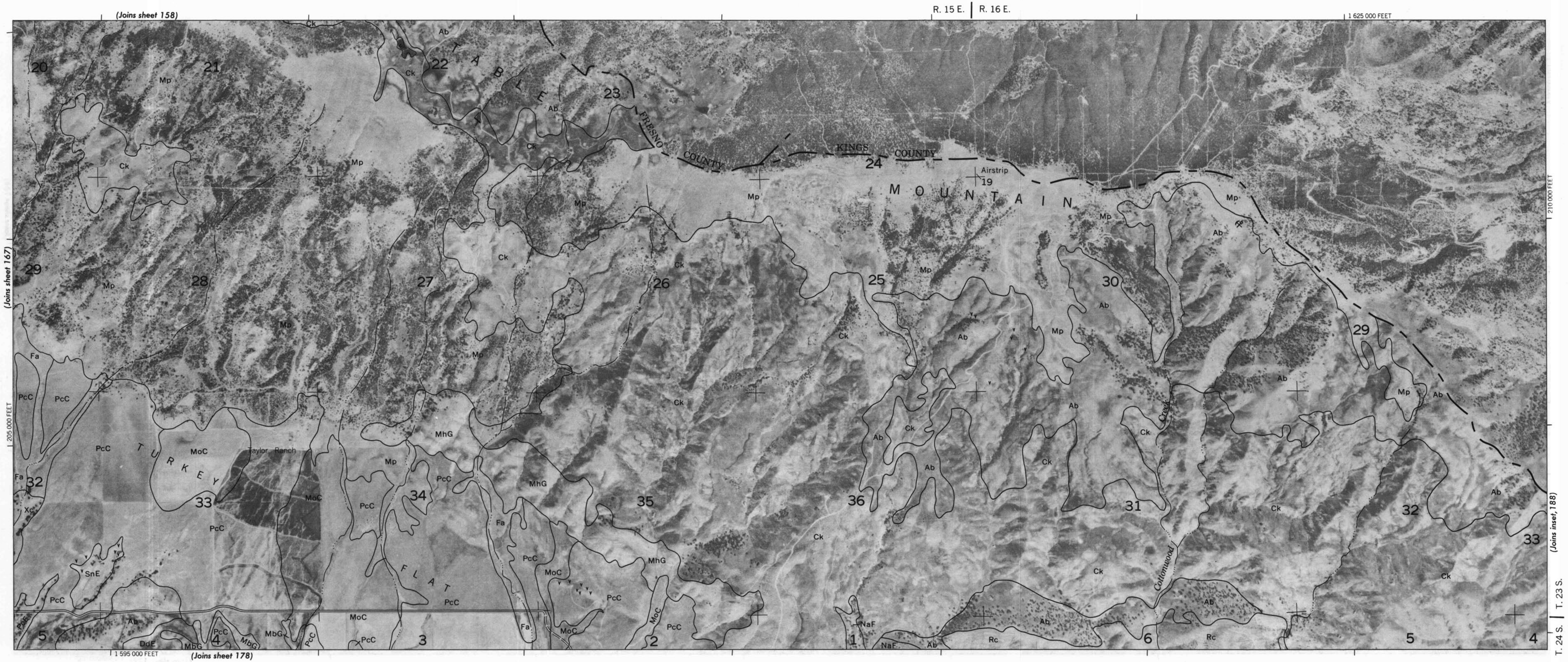
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

N

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 168



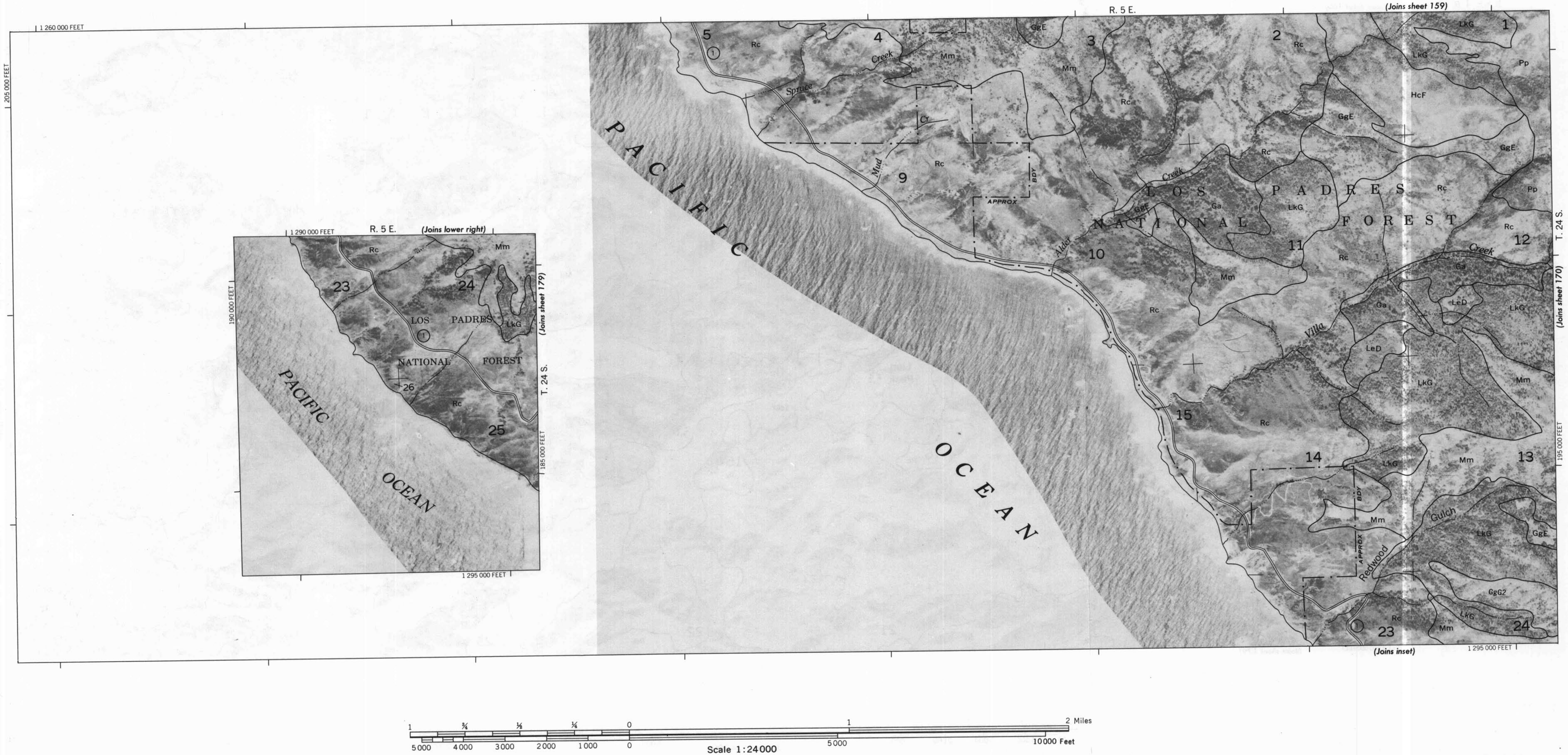
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 169

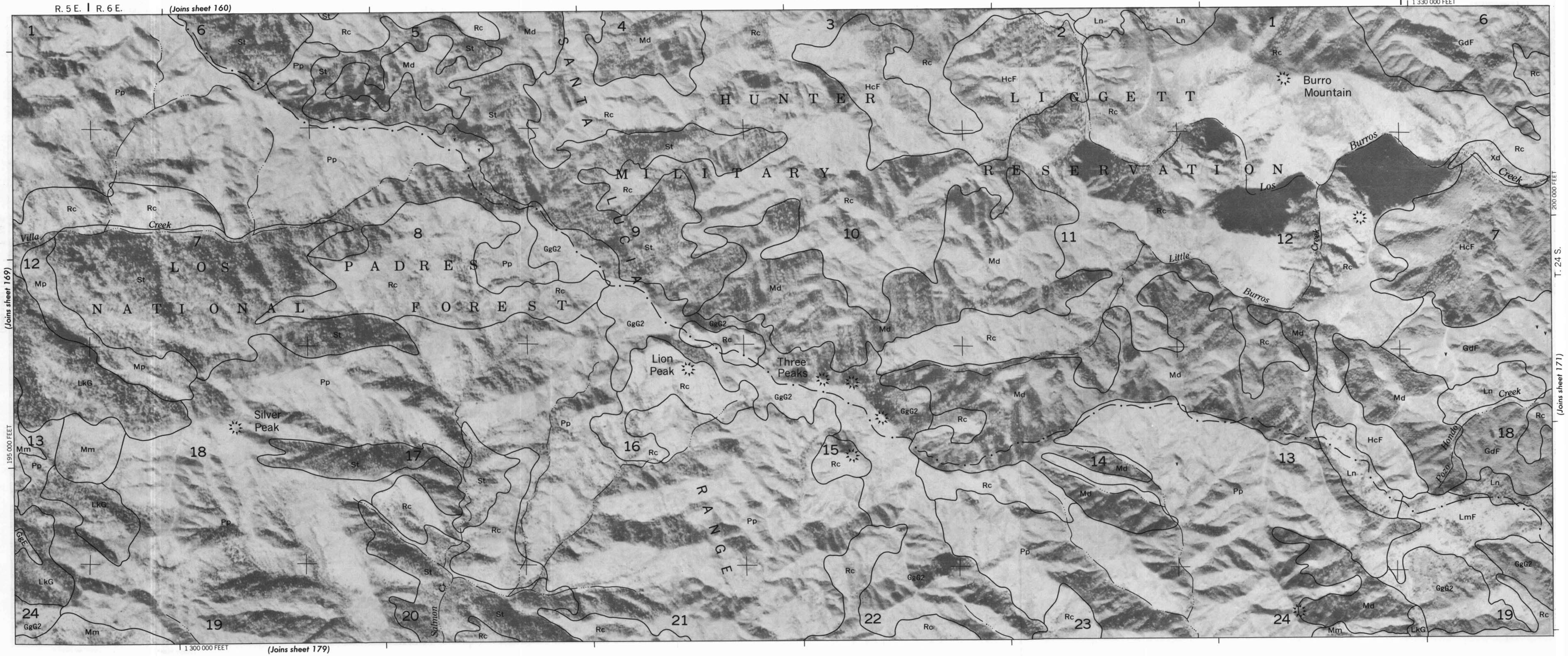


MONTEREY COUNTY, CALIFORNIA NO. 169

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

170

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

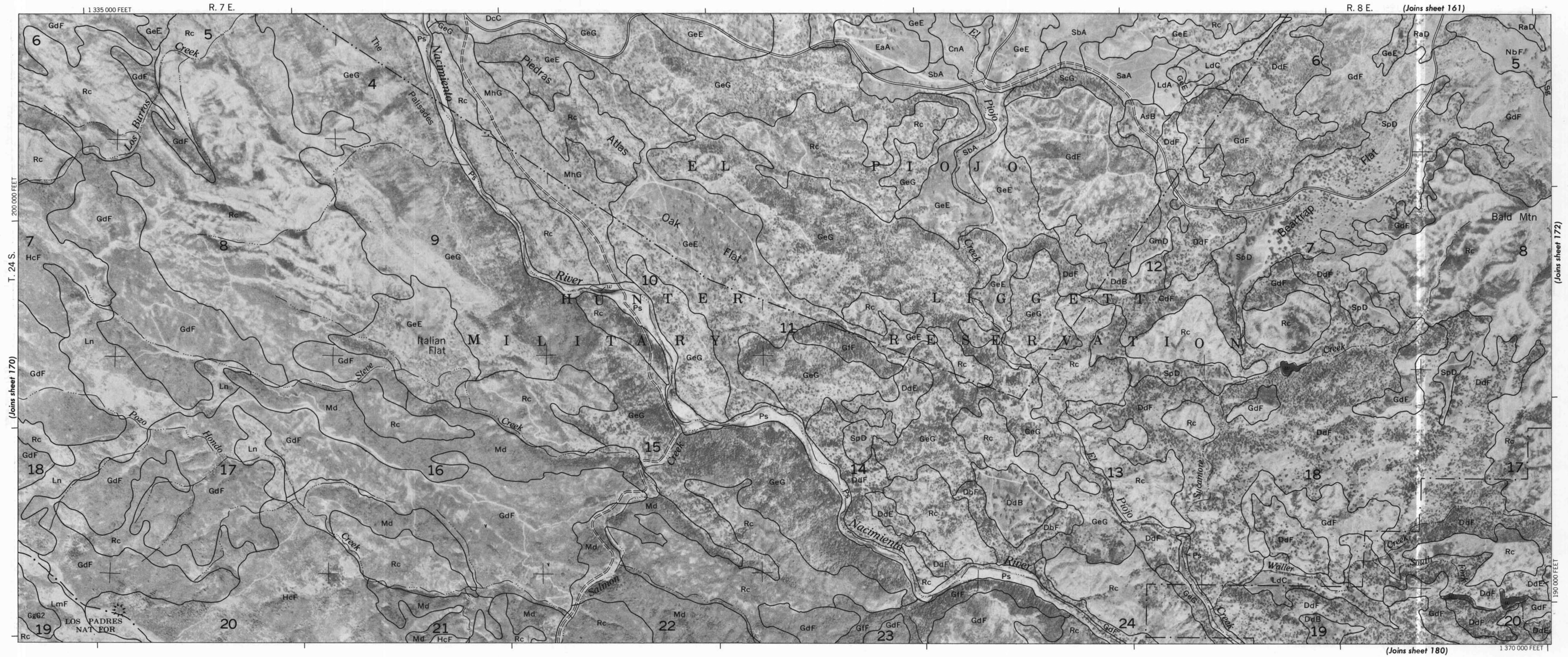
Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

MONTEREY COUNTY, CALIFORNIA NO. 171

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



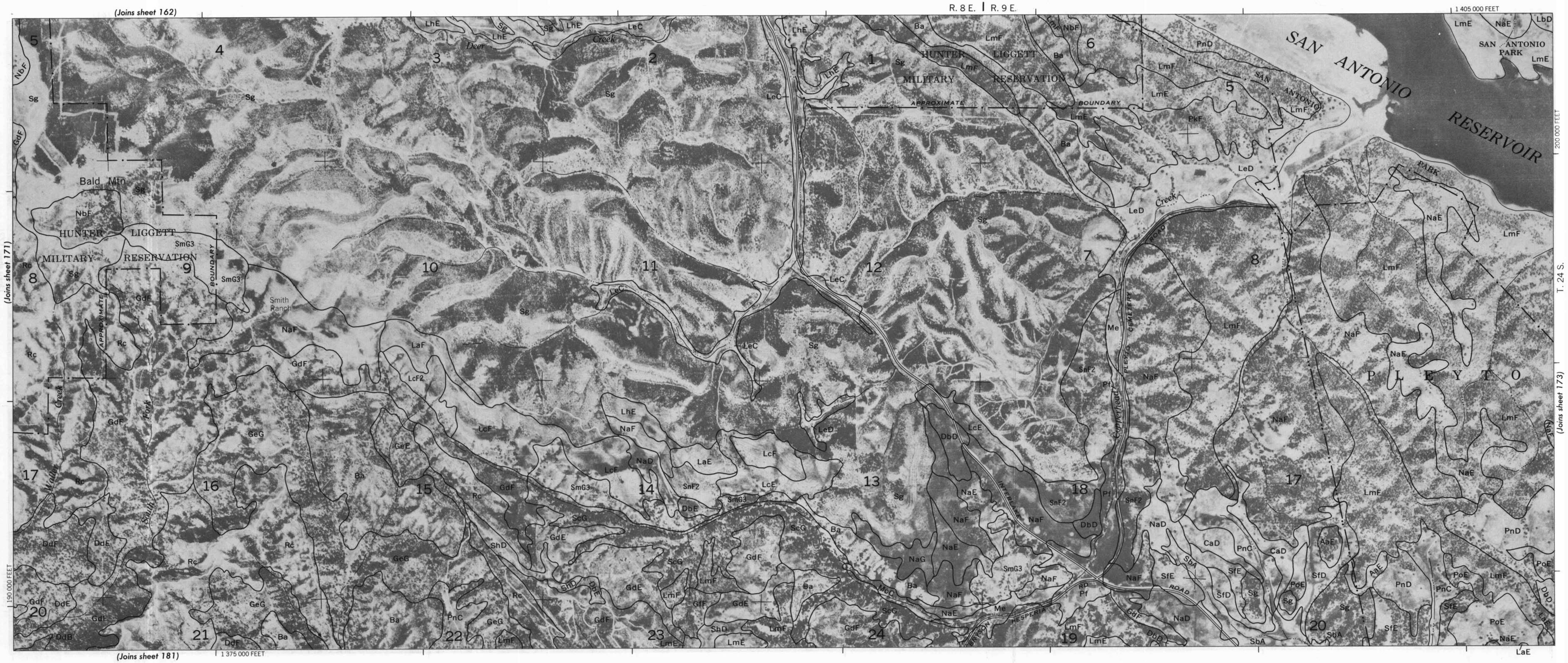
1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

N

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 172



(Joins sheet 162)

(Joins sheet 181)

1 ¾ ½ ¼ 0 1 2 Miles

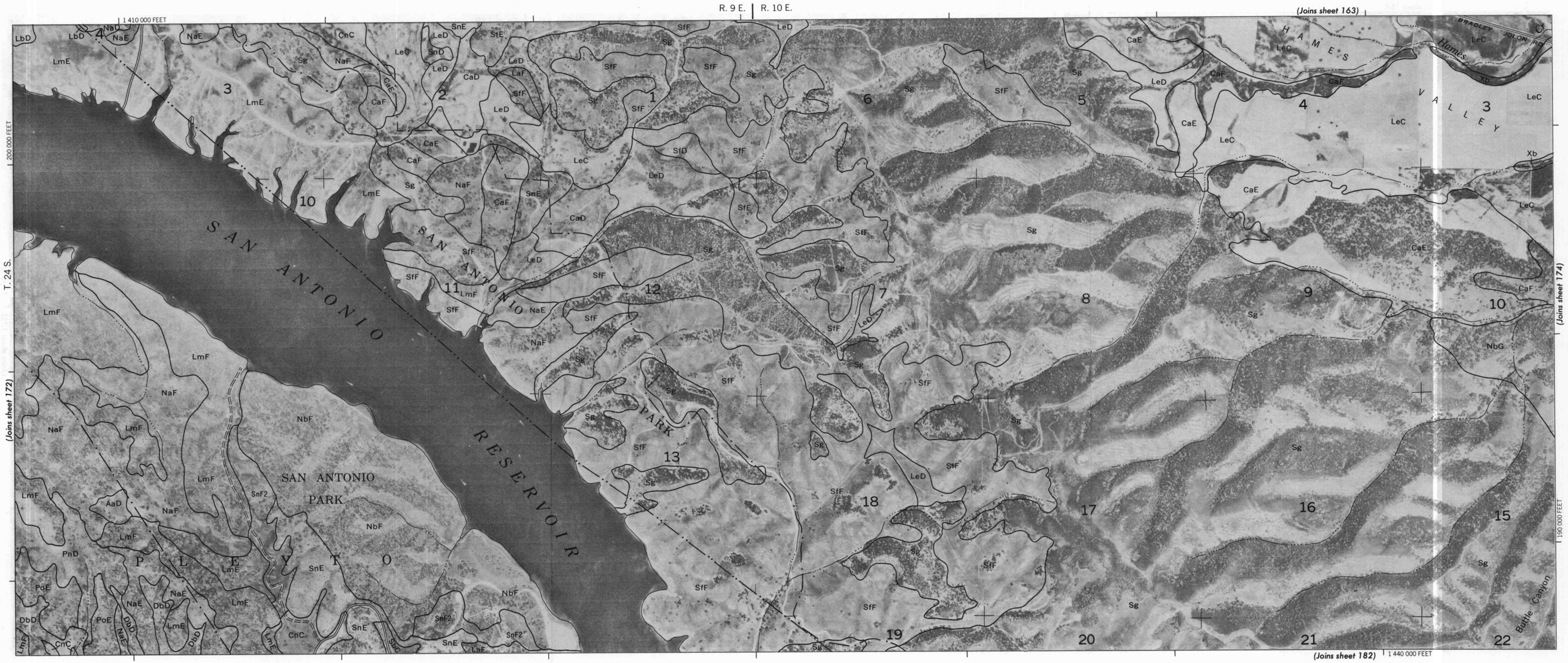
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

173

N



1 ¾ ½ ¼ 0 1 2 Miles

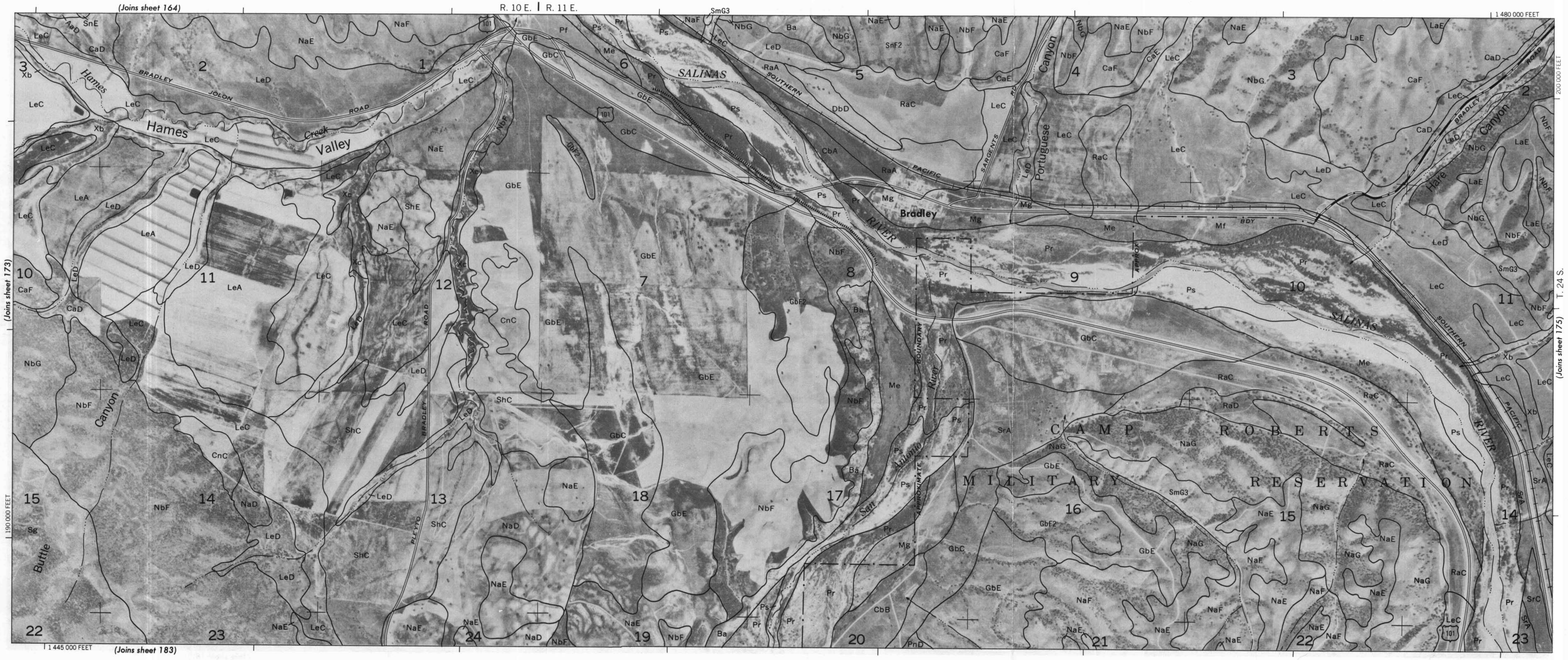
5000 4000 3000 2000 1000 0 5000 10000 Feet

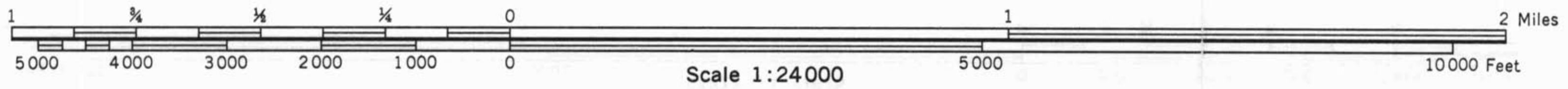
Scale 1:24000

MONTEREY COUNTY, CALIFORNIA NO. 173

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 174





This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA NO. 174

N

MONTEREY COUNTY, CALIFORNIA NO. 175

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 176

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

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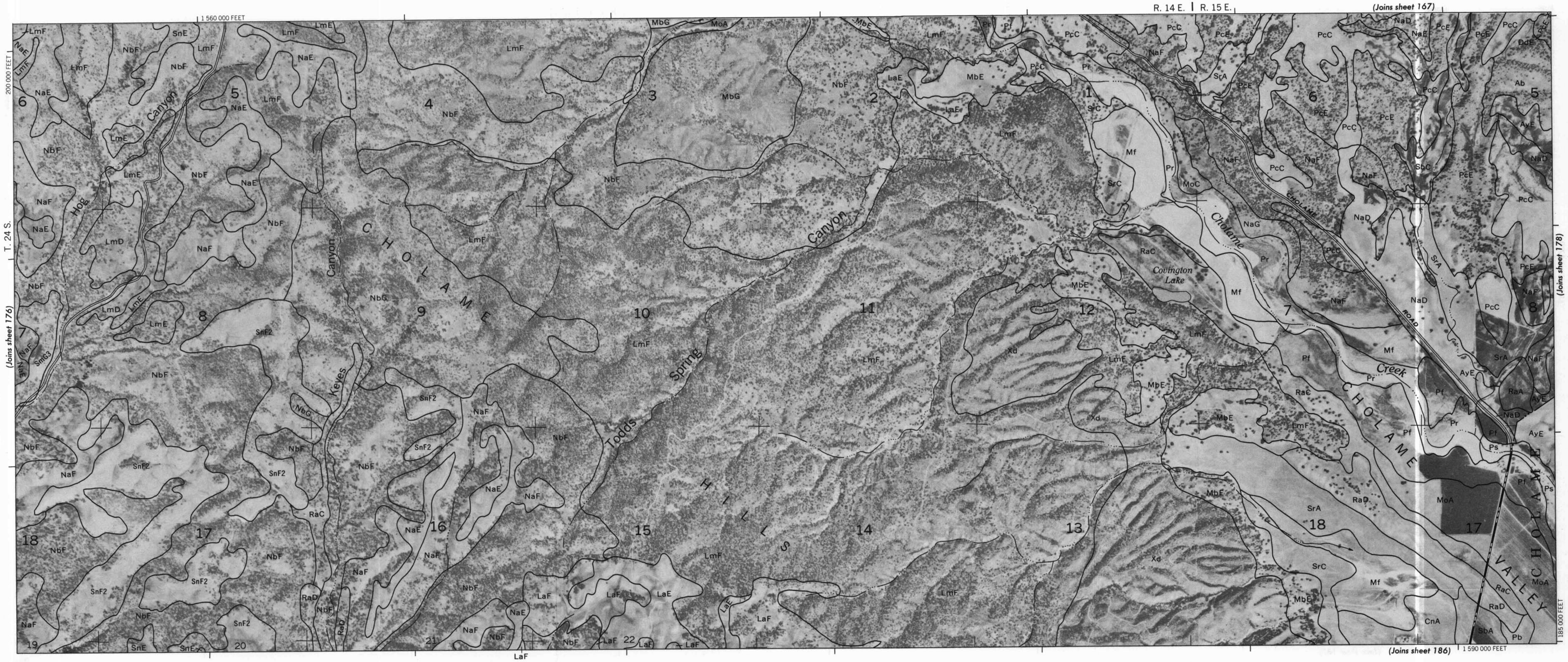
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 178

N

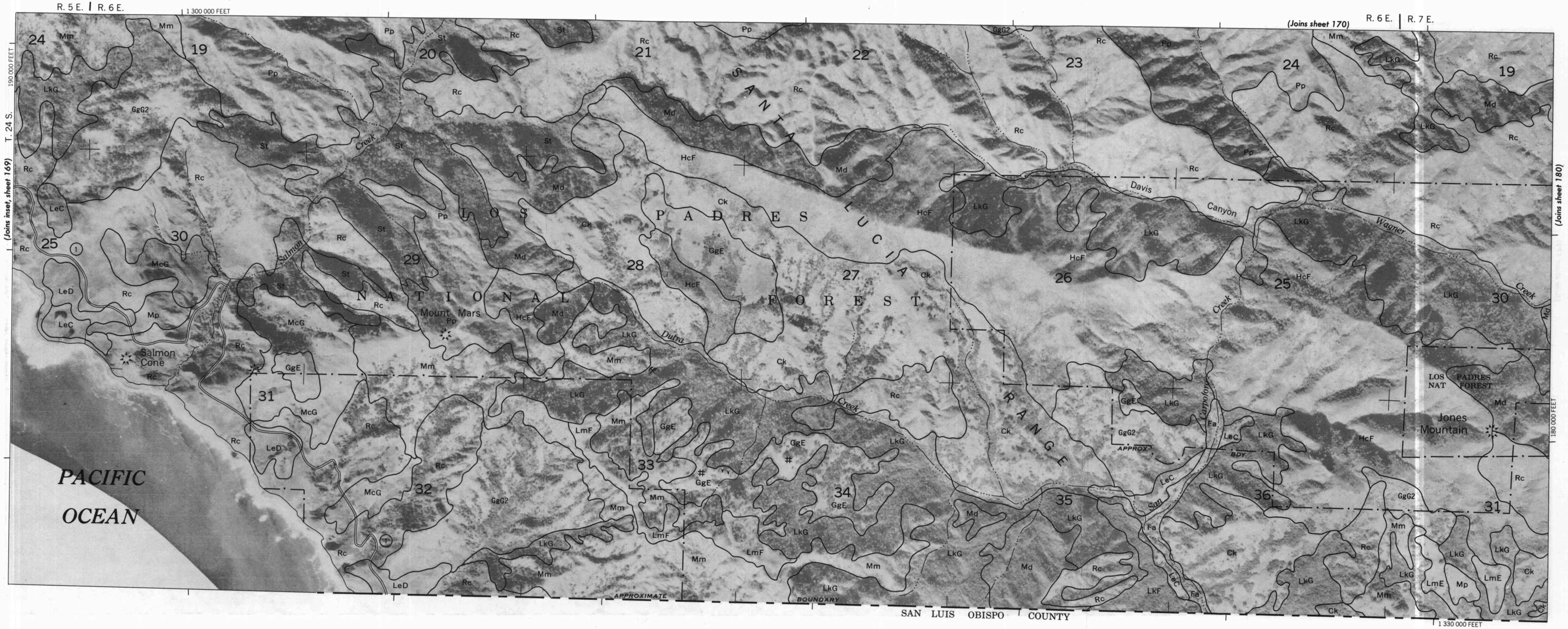
Scale 1:24 000

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 10 000 Feet

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

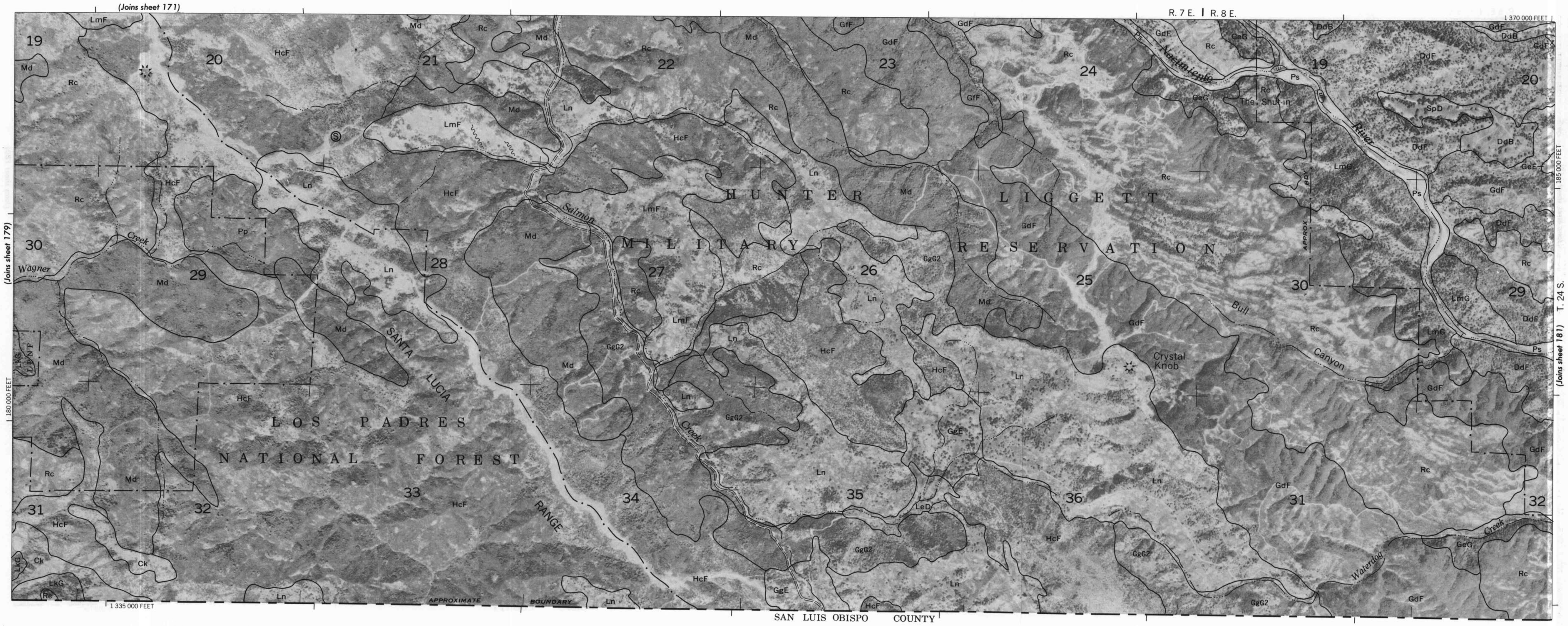
Scale 1:24000

MONTEREY COUNTY, CALIFORNIA NO. 179

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 180

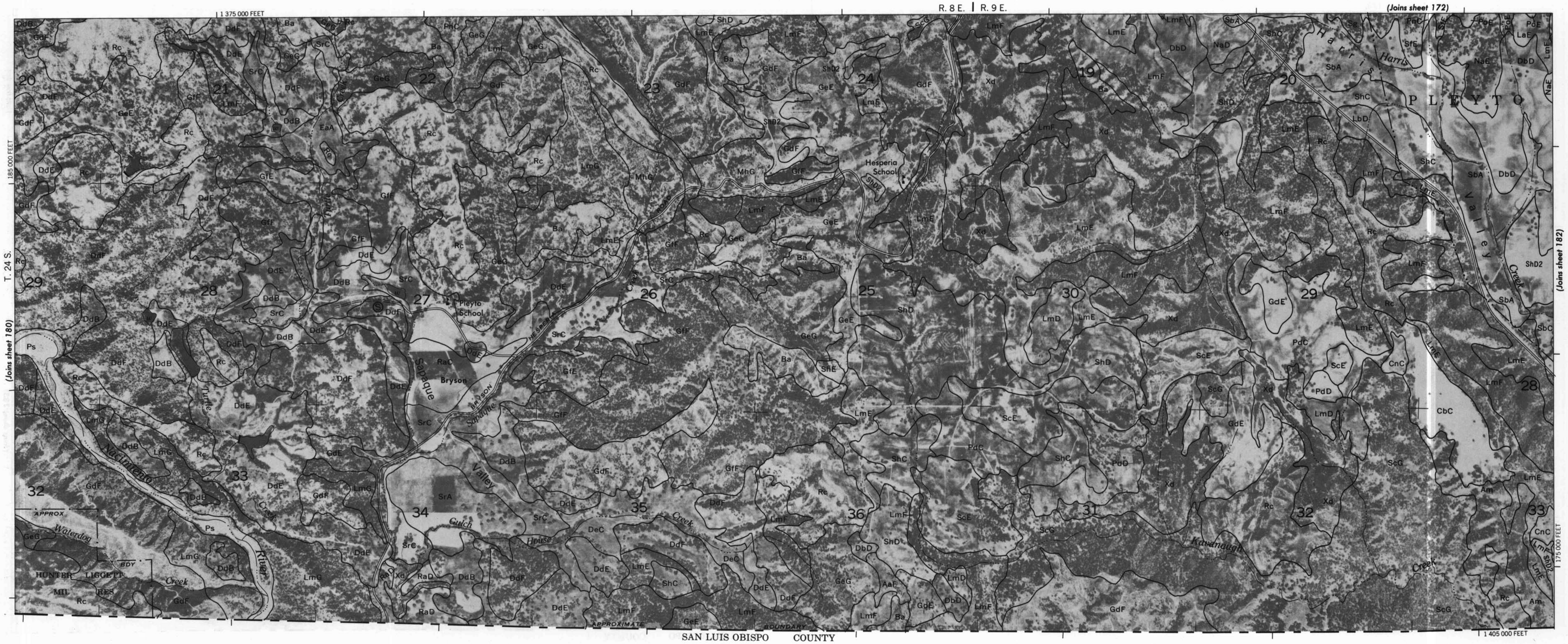
N



Scale 1:24 000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N



1 ¾ ½ ¼ 0 1 2 Miles

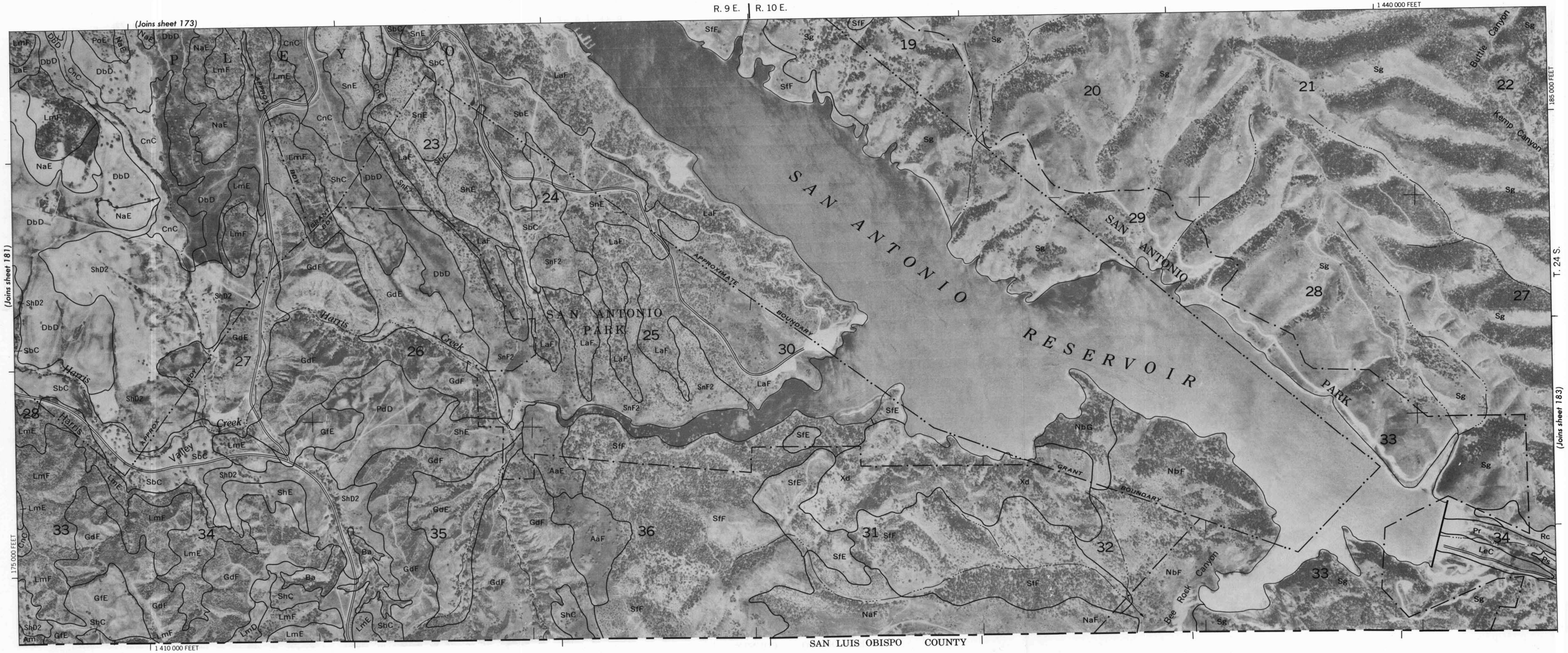
5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

182

N



1 — 3/4 — 1/2 — 1/4 — 0 — 1 — 2 Miles

5000 — 4000 — 3000 — 2000 — 1000 — 0 — 5000 — 10000 Feet

Scale 1:24000

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Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA NO. 182

183

N

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

MONTEREY COUNTY, CALIFORNIA NO. 183

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

184

N

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 184

Scale 1:24 000

1 ¾ ½ ¼ 0 1 2 Miles

5 000 4 000 3 000 2 000 1 000 0 5 000 10 000 Feet

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA NO. 184

185

N

MONTEREY COUNTY, CALIFORNIA NO. 185

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 186

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

187

N

MONTEREY COUNTY, CALIFORNIA NO. 187

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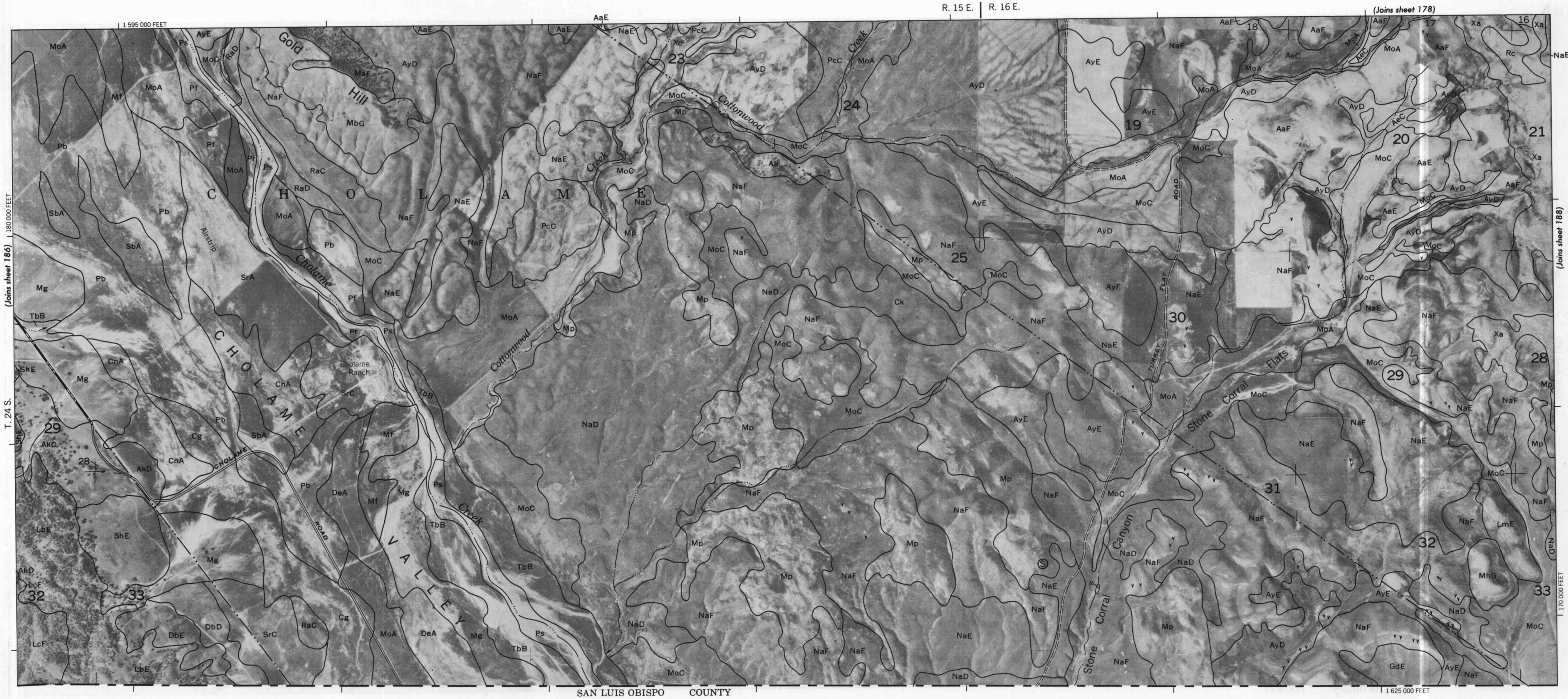
Coordinate grid ticks and land division corners, if shown, are approximately positioned.



1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

MONTEREY COUNTY, CALIFORNIA — SHEET NUMBER 188

N

1 ¾ ½ ¼ 0 1 2 Miles

5000 4000 3000 2000 1000 0 5000 10000 Feet

Scale 1:24000

This map is compiled on 1972 U.S. Geological Survey Orthophotography by the U.S. Department of Agriculture, Soil Conservation Service and cooperating agencies.
Coordinate grid ticks and land division corners, if shown, are approximately positioned.

MONTEREY COUNTY, CALIFORNIA NO. 188